The Genera
OF
BRITISH MOTHS.

BY

H. NOEL HUMPHREYS.

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THE GENERA

OF

BRITISH MOTHS.

POPULARLY DESCRIBED

AND ARRANGED ACCORDING TO THE SYSTEM NOW ADOPTED IN THE

BRITISH MUSEUM.

ILLUSTRATED BY

A Series of Picturesque Plates.

EXHIBITING THE INSECTS IN THEIR DIFFERENT STAGES, WITH THE CATERPILLARS AND THE PLANTS ON WHICH THEY ARE GENERALLY FOUND.

BY

H. NOËL HUMPHREYS.

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PREFACE.

THE study of Natural History is at last beginning to assert its place and importance in the ordinary routine of education. The charm of such works as White's "Selborne," and Kirby and Spence's "Introduction to Entomology," is every day being acknowledged by an increasing circle of fascinated readers, and, as a natural result, a desire to know more of each separate subject there briefly touched upon is becoming very general.

The activity of many workers in the field of science has produced, within the last half-century, complete and invaluable works upon almost every section of Natural History which could suggest itself to the curiosity of any ordinary student. But, then, these are great and voluminous treatises necessarily encumbered with details of classification and technical minutiæ, such as the unprofessional reader has neither time nor taste to encounter. On the other hand, the 'popular' works are in general so fragmental and incomplete, that they fail to give the reader the hold on the subject which he requires, or the more solid information which he seeks.

I have sought, in planning the present work on British Moths, to steer a course midway between the strictly scientific treatise and the slight 'popular volume;' with this view I intend giving a brief outline of the general principles upon which this section of the world of insects has been reduced to order and classification. After which I shall notice all the groups into which our British Moths have been divided, and then describe, with an accompanying illustration, one species of every genus contained in each group or family; to each of which generic illustrations a list of the other species will be attached.

By this means a complete general plan of the whole subject will be exhibited within a moderate space; while if every species contained in a genus were engraved, the bulk of the work would be carried to an unwieldy extent, quite inconsistent with the purpose of a book suited to the general reader. It will be readily understood (I am addressing the unscientific) that by the description of the leading and typical insect of each genus, the general characteristics of the subordinate species belonging to the same genus will be easily appreciated; but in case of any remarkable deviation of forms occurring among a number of species placed in one and the same genus, a second species will be described and engraved, if necessary, as in the case of the genus Chœrocampa, of which two species are figured in plate 3, on account of the great difference in size and markings which they exhibit.

The work will contain, therefore, a very complete account of all the genera of British Moths, and will, to that extent, form a *complete* work, not merely consisting of sketches of some of the more prominent and attractive of the insects belonging to the class treated of, but a consecutive account, although in a popular form, of the entire family of British Moths.

H. N. H.

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INTRODUCTION.

THE order of Insects to which Moths and Butterflies belong, is the one most popularly known, not only on account of the beauty of many of the species, but also from their curious transformations having been more frequently observed, in consequence of their conspicuous appearance in their larva or caterpillar stage; while, in other families of insects, that phase of development is often passed in the earth, in less attractive forms, commonly known as grubs, as is the case with Beetles, etc.

The general term, *insect*, has been given to the tribe of creatures embracing Moths, Butterflies, Bees, Beetles, House-flies, and many others, in consequence of a leading peculiarity which characterises the whole, namely, the deep *insection* which occurs between the fore part of the body, or thorax, and the hinder part, or abdomen, one of the most conspicuous examples of which occurs in the common Wasp.

The distinct order of insects, containing Moths and Butterflies only, is known as the order *Lepidoptera*, from the Greek words *lepis*, a scale, and *pteron*, a wing. This descriptive title has been conferred upon the family of insects about to be described, in consequence of the minute scales with which their wings are almost invariably covered, and to which they are indebted for their beautiful colours and markings, the membrane of the wing itself being perfectly smooth and transparent.

The order *Lepidoptera* was divided by Linnæus into three grand sections: first, *Diurna*, being those which fly by day, comprising all the Butterflies; secondly, *Nocturna*, or those which generally fly by night, which includes a large portion of the Moths; thirdly, *Crepuscularia*, intended to comprise such as generally fly by evening twilight, or at early dawn, like some of the Hawk-Moths, etc. But this third division having been found indefinite, and the time of flight in general not the best basis of classification, the system of a modern entomologist, Dr. Boisduval, has been pretty generally adopted. According to this method, the order may now be considered to consist of two grand divisions, founded, as the only true basis of correct classification, on anatomical distinctions. The first division is termed *Rhopalocera*, or those having a small *club-like* enlargement at the ends of the antennæ, commonly termed horns, or, more properly, feelers. The second division is termed *Heterocera*, from two Greek words meaning antennæ varying in shape, as do those of the Moths, which are sometimes smooth, sometimes feathered, sometimes robust, sometimes slender; while those of the males very frequently differ from those of the females, but they are in no instance *clubbed*, like those of Butterflies.

The careful observation of such distinctions as those by means of which the affinities of numerous tribes of insects can alone be accurately defined and classed, would form an excellent first lesson to the young student, and at once open up to him a novel and interesting field of observation. I recollect one of the most eminent of European entomologists, Mr. J. O. Westwood, showing me drawings of the Tiger-Moth, made when he was a tyro in the study, in which, for want of that habit of accurate observation which the study of natural history soon developes, he had made the antennæ *clubbed*, like those of a Butterfly. Such was the first entomological step of the author of the "Modern Classification of Insects;" a work which, had he produced no other, would secure to his name a conspicuous place in the annals of Entomology; so let no student be discouraged by the difficulties which invariably attend beginnings.

The transformations are of closely analogous character in both sections of our order *Lepidoptera*. The female Butterfly, like the female Moth, deposits a certain number of eggs, from which, in due time, emerge small worm-like creatures, commonly called Caterpillars. These generally cast their skins several times before they attain their full growth, at which period they sink into a dormant state, in the commencement of which a husk or shell is formed about them, and they become what is termed a chrysalis. The chrysalides of Butterflies are generally somewhat angular in form, while those of Moths are almost invariably smooth in character. The Caterpillars of Butterflies frequently undergo their change to the chrysalis state suspended to a leaf or branch, while those of Moths, in most cases, either form a cocoon, or retire into the ground, often to a considerable depth, when the time arrives for their metamorphosis.

During the chrysalis state (both in Moths and Butterflies) the final or perfect form of the insect is gradually developing itself; the rudimental wings, and even the antennæ, neither of which were externally developed in the Caterpillar, being from the first distinctly traceable in the forms assumed by the shell of the chrysalis. When the development of the newly winged insect has attained a certain degree of completeness, the shell of the chrysalis is rent by an instinctive effort, and the insect emerges. All the parts now appear perfect and full-grown, except the wings, which are at first quite soft, and not above a quarter their size, but they harden and increase in dimension with astonishing rapidity when exposed to the air, and when they have attained their full development the final transformation is completed.

THE GENERA OF BRITISH MOTHS.

PLATE I.

No. 1.—The Eyed Hawk-Moth (*Smerinthus Ocellatus*).
No. 2.—The Caterpillar of the Eyed Hawk-Moth.
No. 3.—The Poplar Hawk-Moth (*Smerinthus Populi*).
No. 4.—The Death's-head Hawk-Moth (*Acherontia Atropos*).
No. 5.—The Caterpillar of the Death's-head Hawk-Moth.

THE first subdivision of the great section *Heterocera* which I shall describe, is that comprised under the title of *Sphingidæ*, or *Sphinxes*, which consists of the Hawk-Moth family, and contains some of the largest and handsomest of our British Moths. The term Sphinx was somewhat capriciously conferred by Linnæus in consequence of a supposed resemblance of many of the Caterpillars of this family to that fabulous creature. This resemblance occurs when the Caterpillar lies with the main part of the body straight along a leaf or branch, with the three segments next the head raised nearly upright, in which position the general outline has certainly some slight affinity to the form of the chimera from which it has received its name.

The family of *Sphingidæ* contains several genera, the first genus being *Smerinthus*, distinguished more especially by the short, stout body of the perfect insect, and the irregular outline of the external edge of the wings. The Caterpillars of the genus are generally green, and invariably covered with small tubercles, closely arranged in regular rows, and the sides marked with a series of diagonal streaks, either of a paler green than the rest of the body, or tinged with red or violet. It may here be stated that only a few of the more obvious characteristics of each family or genus can be described in this work, and that in speaking of the general character of a family, genus, or species, only the British kinds are referred to. The genus *Smerinthus* contains three species.

No. 1, Plate 1, is *Smerinthus Ocellatus*, they Eyed Hawk-Moth, which, it will be seen, exhibits the general characteristics attributed to the genus. The antennæ have, in this group, a tendency to thicken before the final attenuation of the point, which occurs only in this and in the next two families of Moths. They are, in this genus, more slender in the females than the males, which last, in our plate, are represented as rather too robust. The flight of this genus is more like that of ordinary Moths than of other members of the Hawk-Moth family. The Caterpillar (No. 2), as will be observed, is furnished with a dorsal horn, or tail, a peculiarity present in the whole of the group which have the true Hawk-Moth character, though absent in the *Ægeriidæ*, which by some authors are added to this family. The Caterpillar of the Eyed Hawk-Moth feeds chiefly on the Willow, and is not uncommon. It appears in July and August, and the perfect insect issues from the chrysalis in the following May.

No. 3, Plate 1, is the Poplar Hawk-Moth, *Smerinthus Populi*, the commonest of the genus. Its markings are not so beautiful as those of the preceding species, but yet present very agreeable tones of soft dove-colour, buff, and brown; the veins, or rather nervures of the wings, being of a warm ochreous tone. The Caterpillar is very similar to that of *S. ocellatus*, but smaller, and without any pink tone in the lateral stripes, which are of a very pale green. It appears in the autumn, changes to the chrysalis state about September, and the perfect insect emerges in the following June.

The remaining species of this genus is *Smerinthus Tiliæ*, the Lime Hawk-Moth, a smaller kind than either of the preceding, but similar in form and in the character of the markings of the wings, which, however, are of a much warmer general tone, the ground rich warm buff, the markings a brightish olive, and the body whitish brown. The Caterpillar is smaller than that of the other species, and slenderer, and the lateral markings are faintly tinted with pink. It feeds on the Lime, but is rather rare.

The next genus in the family is *Acherontia*, of which there is only one British species—the largest and most remarkable of all British Moths—the well-known Death's-head Hawk-Moth (No. 4), so termed from the figure of a skull plainly marked on the thorax, between the wings. The robust body, and wings straight at the external margin, with the shorter antennæ, and shorter proboscis, which is scarcely longer than the head, are sufficient to mark this insect as of a different genus to that of the three species just described. But there are also other differences, especially in the details of the antennæ, too minute to describe in this place. The Caterpillar (No. 5) is also distinct in form. The dorsal horn, or tail, is decumbent instead of raised, and is jagged with small excrescences instead of being smooth; while the body is entirely without the minute tubercles which distinguish the Caterpillars of the genus *Smerinthus*. The Death's-head Moth is probably the most remarkable of all British insects, often measuring five inches across the wings, and the Caterpillar is even larger in proportion. The Caterpillar, while in full feed in autumn, is often found in digging potatoes, on the leaves of which it has been feeding, and has afterwards burrowed into the ground to undergo its change. Many attempts are made to obtain specimens of the perfect insect by keeping the Caterpillar, and allowing it to burrow in the soil of a large flower-pot, covered with a strong net; it generally perishes, however, during its transformation, possibly from the soil becoming too dry. It is therefore recommended to plunge the pot in the soil of the open garden, with some good drainage underneath, and in a situation not exposed to heavy rain, with which precaution specimens may assuredly be obtained of this truly magnificent insect. The Death's-head Hawk-Moth has been unusually abundant during the past season of 1858, having been found as far north as the Shetland Isles.


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PLATE II.

No. 1.—The Privet Hawk-Moth (*Sphinx Ligustri*).
No. 2.—The Caterpillar of the Privet Hawk-Moth.
No. 3.—The Spotted Hawk-Moth (*Deilephila Euphorbiæ*).
No. 4.—The Caterpillar of the Spotted Hawk-Moth.
No. 5.—The Striped Hawk-Moth (*Deilephila Livornica*).

THE separate genus still bearing the name of Sphinx, which once belonged to nearly the whole group of *Sphingidæ*, now contains but three British species, which are, however, those most highly characteristic of the typical Hawk-Moth, having a slenderer and sharper body, longer, more pointed, and more even-edged wings, and a more rapid flight ; in short, all the characteristics for which the highly descriptive popular name Hawk-Moth was originally conferred.

The first and largest species of this genus is the handsome *Sphinx Convolvuli*, the Convolvulus Hawk-Moth, which I have not figured, as rarely found in England in ordinary seasons. The fore wings are ashy-gray, beautifully clouded with brown, and streaked with black ; the hind wings being gray also, with three transverse bands of brown, the centre band open in the middle, and joined at the extremities. The abdomen is beautifully barred with black, white, and deep pink. The Caterpillar has the usual dorsal horn, is of a dull olive colour, with white spots near the junction of the segments, two brown stripes down the back, and transverse slanting bars of brown at the sides. It feeds on the common Bind-weed. Though generally excessively rare, it is occasionally abundant, as it was in 1846, and somewhat less so during the last season (1858), when I took a fine specimen in my own garden hovering over a bed of Petunias.

The next species, No. 1, Plate 2, is the better-known Privet Hawk-Moth, nearly as large and handsome as the preceding, and found abundantly everywhere. The Caterpillar, which feeds on the Privet, is green ; the dorsal horn black above and yellow beneath ; the spiracles, or breathing apertures, just above the feet, to be remarked in all this class of Caterpillars, are orange, and the diagonal stripes tinged with pink. The Caterpillar appears in July and August, and the Moth emerges from the chrysalis in the following June.

The last species of the genus *Sphinx* is the Pine Hawk-Moth, *Sphinx Pinastri*, much smaller than either of the preceding ; both front and hind wings are gray, the front pair having clouded transverse bands of brown, and the hinder pair shading off to deep brown at the outer edge ; the body is marked with brown on the thorax, and barred closely with brown on the abdomen. The Caterpillar is very different in character to those of the other species, being of much slenderer proportions. The sides are deep green, with lozenge-shaped openings of gray, and having a yellow line beneath, and along the centre of the back, with the dorsal horn nearly black. It feeds on the Pine, and is common in the forests of the Continent, but very rare in England. There are other species of *Sphinx* reputed British, such as *Cingulata*, *Carolina*, *Quinque-maculatus*, etc., but they are probably imported specimens.

Of the next genus, *Deilephila*, there are three British species, two of which are figured in the adjoining plate. This genus is distinguished from the preceding by somewhat shorter wings, less acute and elongated at the tips, and other sufficient distinctions, of which the Caterpillars offer several ; the character of their markings differing from those of the preceding genera, in having the three segments next the head marked in the same manner as those of the other portions of the body.

The Spotted Hawk-Moth, *Deilephila Euphorbiæ*, No. 3, Plate 3, is a very elegant insect, both in markings

and colour ; and the Caterpillar, No. 4 in the same plate, is one of the handsomest of the whole group. It feeds generally upon the Sea Spurge, *Euphorbia Paralias.* These Caterpillars were one season so conspicuous on the coast of Devonshire, from their numbers, that birds were attracted from a distance to feed upon them. They are now very rare. They appear in July and August, and are full-grown in September.

No. 5, Plate 3, is the Striped Hawk-Moth, *Deilephila Livornica.* This species is easily distinguished by the nervures of the wings being white, imparting a remarkable, striped appearance, not found in the other species. The Caterpillar feeds on the common Vine, on the *Sonchus arvensis,* and Yellow Ladies' Bed-straw ; its markings are like those of the others of the genus, very handsome ; the colour is a yellowish olive, with large spots of black surrounding specks of red : a rose-coloured stripe runs down the back, extending along the dorsal horn, and above the legs is a stripe of flesh colour, or yellow. It is full-grown in June. This species is very rare and was formerly considered doubtful as British ; but Brighton, Glasgow, Leicester, the Lake District, Manchester, &c., are cited as places in which it has been recently captured.

Deilephila Galii, the last species of this genus, is also very rare, and popularly known as "The Scarce Spotted Hawk-Moth." It is very like the Spotted Hawk-Moth above described, but has the space next the outer edge of the front wings pale buff instead of ash-coloured, and a row of white spots down the middle of the back. The Caterpillar is rich olive, with a black stripe above the legs, enclosing the white spiracles, and a large roundish patch of buff in each segment, and a buff stripe runs down the back, and the head and legs are rose-coloured. It feeds on Yellow Ladies' Bed-straw, and other species of Galium, in the autumn.


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PLATE III.

No. 1.—The Oleander Hawk-Moth (*Chærocampa Nerii*).
No. 2.—The Caterpillar of the Oleander Hawk-Moth.
No. 3.—The Small Elephant Hawk-Moth (*Chærocampa Porcellus*).
No. 4.—The Caterpillar of the Small Elephant Hawk-Moth.
No. 5.—The Humming-Bird Moth (*Macroglossa Stellatarum*).
No. 6.—The Caterpillar of the Humming-Bird Hawk-Moth.
No. 7.—The Narrow-bordered Bee Hawk-Moth (*Sesia Bombyliformis*).
No. 8.—The Green Forester (*Procris Statices*).
No. 9.—The Six-spot Burnet-Moth (*Anthrocera Filipendulæ*).
No. 10.—The Caterpillar of the Six-spot Burnet-Moth.

The genus *Chærocampa* (from the Greek words *choiros*, a hog, and *kampe*, a caterpillar) has been formed of a small section of the *Sphingidæ*, the Caterpillars of which have their three foremost sections narrowing in a nearly even line from the shoulder, like the head and snout of the hog. They have also the power of drawing in or extending those segments, from which some of them have received their popular English name of Elephant Hawk-Moth. The dorsal horn is much shorter in this group, and in some species nearly obsolete.

No. 1, Plate 3, *Chærocampa Nerii*, is the Oleander Hawk-Moth. It has only recently been found to be a native of these islands, and its capture rarely occurs. In the south of France, however, and, in some years, even in the northern provinces of Central Europe, it is very abundant. The Caterpillar (No. 2, Plate 3) appears in the autumn, and feeds on the Rose-bay (*Nerium Oleander*), where that plant is common, but in England upon the lesser Periwinkle, a plant of the same family. This insect is found both in Africa and Asia.

No. 3, Plate 3, is *C. Porcellus*, the Lesser Elephant Hawk-Moth. The Caterpillar (No. 4) forms a very good type of those larvæ, upon the forms of which this genus has been based. The three first segments have the character above described, and the fourth and fifth, or legless segments, are distinguished by eye-like marks, not found in that position on any allied class of Caterpillars. In this they are distinct from the species which stands at the head of the genus, which has this *ocellus* on the third segment, for which reason some have thought of making it the type of a separate genus. The Caterpillar of the Lesser Elephant Hawk-Moth feeds on different kinds of Galium.

C. Elpenor, the Greater Elephant Hawk-Moth resembles the Lesser, both in its larva and perfect states, but is about one-third larger. The fore wings are marked with brown and dull pink, instead of buff and olive, like the Lesser species, and the hind wings with rich pink and black. The Caterpillar is hardly distinguishable from the one above described, except from its superior size. It feeds, in preference, on the common *Epilobium*.

The last species, *Chærocampa Celerio*, the Silver Streaked Hawk-Moth, is of similar character, but the Caterpillar is much larger, and has the dorsal horn more defined than in the two last species. The wings of the perfect insect differ in being longer and sharper—fitted for that celerity of flight which suggested its specific name, *celerio;* they are of a brown colour, with pearl-white streaks, from which it takes its popular name. The hind wings are buff, flushed with pink, and having two stripes of deep brown or black. It feeds on the Galium.

The next genus, *Macroglossa*, only contains one British species. It is distinguished from the preceding genera by being distinctly a daylight instead of a twilight or night-flyer, and by its tufted tail. The Caterpillar, however, has the true Sphinx character of the dorsal horn.

No. 5, Plate 3, is *Macroglossa Stellatarum*, the Humming-Bird Hawk-Moth, the popular name being suggested by the loud humming noise which it makes while hovering over flowers or other objects. The Caterpillar (No. 6), it will be observed, has the family feature, the dorsal horn, well defined.

We come now to the genus *Sesia*, by some made a separate family, the *Sesiidæ*, but by others joined to the *Sphingidæ*, to which family, from the existence of the remarkable feature of the caudal horn in the Caterpillar stage, and the form of the wings in the perfect state, together with the thickened extremities of the antennæ, it is evidently closely allied.

No. 7, Plate 3, is *Scsia Bombyliformis*, the Narrow-bordered Bee Hawk-Moth. The wings are denuded of the coloured scales with which the wings of Moths are usually clothed, except at the external edge next the brown fringe, and they are therefore perfectly transparent, the nervures showing dark, like the tracery of a window. The body is marked with yellow, in a peculiar manner, which causes it to bear considerable resemblance to the Bee tribe of insects, with which, however, it has no other connection. It is from this circumstance, however, and the clear wings, that it has received the name of the *Bee* Hawk-Moth. The Caterpillar is pale green, striped with yellow and a deeper green, and speckled with minute black spots. It feeds on *Scabiosa succisa*, and appears in autumn.

The other species of this genus, *Scsia Fuciformis*, the *Broad*-bordered Bee Hawk-Moth, closely resembles the preceding, except in the breadth of the deep brown border, and some of the markings of the body.

THE SECOND FAMILY.—(The Anthroceridæ.)

(BY SOME AUTHORS THIS FAMILY IS PLACED BEFORE THE SPHINGIDÆ.)

This family is a very restricted one, in as far as the British kinds are concerned. Its relation to the preceding forms of the *Sphingidæ* only consists in the antennæ thickened at the end, a character which, after the next family, entirely disappears. The nervures of the wings, however, are no longer disposed after the simple manner to be observed in the more conspicuous *Sphingidæ* and many other families of Moths, but exhibit a much more complicated arrangement. This family is also distinguished by its dark rich colouring, and by the small size of all the species.

The first English genus of this order is *Procris*, containing two British species.

No. 8, Plate 3, is *Procris Statices*, the common Green Forester. The antennæ of *Statices* are blunt, which distinguishes it from the other species. The Caterpillar, which resembles in form that of the next genus, appears in spring, and the perfect insect about the middle of June.

The second species of *Procris* is *P. globularia*, the *pointed* antennæ of which form a good specific distinction.

The next genus is *Anthrocera*, containing several British species.

No. 9, Plate 3, *Anthrocera Filipendulæ*, the Six-spot Burnet-Moth, is one of the most richly tinted of our native insects, the body and wings being of a rich glossy black, with a metallic flush of bright green, in some lights ; the spots and hind wings being deep crimson. The Caterpillar (No. 10) feeds in preference on *Spiræa Filipendulæ* in the spring, the perfect insect appearing in June.

There are five other species of Burnet-Moth.

1. *Anthrocera Loniceræ*, the Large Five-spot Burnet-Moth, distinguished principally by the broader black margin of the hind wings, and having only three red spots instead of four in the exterior portion of the fore wings. The Caterpillar is also said to be greener than in the previous species.

2. *Anthrocera Trifolii*, the Small Five-spot Burnet, closely resembles the former, but has the spots less defined, and sometimes two running into one.

3. *Anthrocera Meliloti* (the new Small Five-spot). This appears a more distinct species. It has five spots, like the two preceding, but the wings are semi-transparent. The Caterpillar is described as green, but with the usual black marks, and with a white line down the back. It is, however, by many deemed only a variety.

4. *Anthrocera Hippocrepidis.* This species differs in having rather a blue than a green gloss on the black portions, except in the margins of the hind wings, which are greenish.

The last two species were adopted as distinct and English, by Mr. Westwood, after examining several specimens taken by our eminent entomologist, the late Mr. F. Stephens, but both are now considered accidental varieties.

5. *Anthrocera Minos*, the streaked Burnet, is a species only recently discovered, in the west of Ireland. It differs from the spotted species in having the red marks on the anterior wings blended into three long angular marks, the point of the one nearest the margin descending between the two other marks in the form of a wedge. It is said to appear earlier than the spotted species. It is certainly a very distinct species.

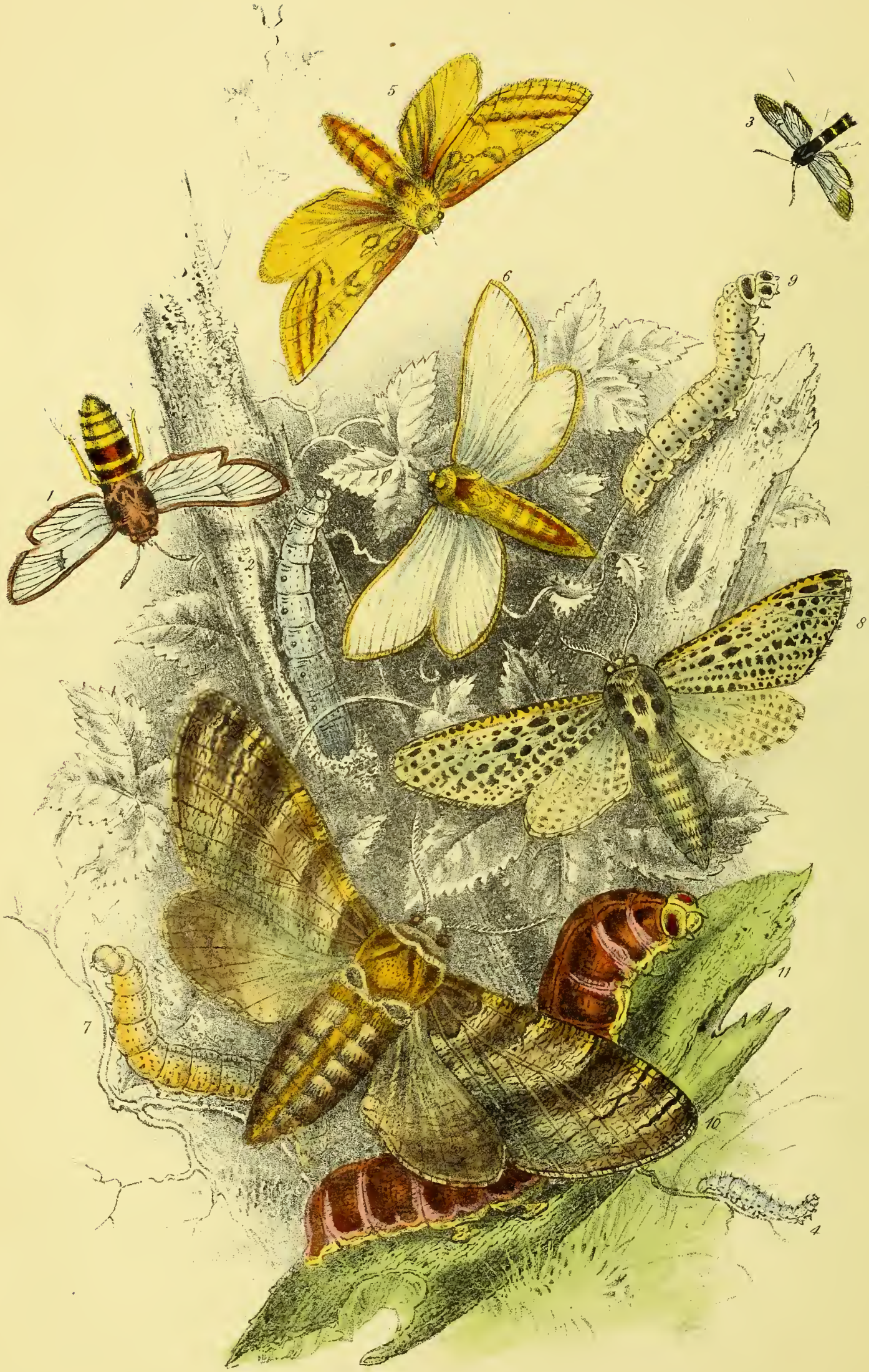

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PLATE IV.

No. 1.—The Hornet-Moth (*Sphecia Apiformis*).
No. 2.—The Caterpillar of the Hornet-Moth.
No. 3.—The Currant Clearwing (*Trochilium Tipuliforme*).
No. 4.—The Caterpillar of the Currant Clearwing.
No. 5.—The Ghost-Moth (*Hepialus Humuli*), the Female.
No. 6.—The Ghost-Moth (the Male).
No. 7.—The Caterpillar of the Ghost-Moth.
No. 8.—The Wood-leopard-Moth (*Zeuzera Æsculi*).
No. 9.—The Caterpillar of the Wood-leopard.
No. 10.—The Goat-Moth (*Cossus Ligniperda*).
No. 11.—The Caterpillar of the Goat-Moth.

THE THIRD FAMILY.—THE ÆGERIIDÆ.

THIS family is by some made the fourth, in consequence of the separation of the genera *Macroglossa* and *Sesia* from the *Sphingidæ*, as the third family, under the title of the *Sesiidæ*. The *Ægeriidæ* are closely connected with the *Sphingidæ* by the character of the antennæ. The wings of this family of insects are generally without scales, except at the anterior margin, and, in some, in a certain space at the tip. The body is long, which, with the clear wings, causes them to resemble certain insects of the order *Hymenoptera*. The larvæ of these Moths are fleshy grubs, feeding in the interior of young branches, or on the roots of trees; they have, however, the legs disposed as in the larvæ of the *Sphingidæ*, and of the same number. There are two British genera in this family.

The first genus is *Sphecia*, distinguished from all the rest of the family by the large size of the insects assigned to it, and by their wasp-like appearance, in allusion to which Hübner first gave them the generic name *Sphecia*, and separated them from the genus *Trochilium*.

No. 1, Plate 4, is the Hornet-Moth, *Sphecia Apiformis*, distinguished from the next species by the broader border to the transparent wings. The Caterpillar (No. 2) feeds upon the wood of the trunks of Willows and other trees, causing considerable damage. It changes to the Chrysalis in April, and the perfect insect appears in June.

The second species, *Sphecia Bembeciformis*, is popularly known as the Lunar Hornet-Moth. It is rather smaller than the preceding, and has the brown border of the transparent wings narrower.

The second genus in the family of the *Ægeriidæ*, is *Trochilium*, containing several native species, to which two remarkable additions have been made by recent discoveries. It is distinguished from the preceding by the small size of all the species, by the greater slenderness and length of the antennæ, and by a pencil-like tuft at the tail, of various colours in different species.

No. 3, Plate 4, is *Trochilium Tipuliforme*, popularly known as the Currant Clearwing, which I have selected as the representative of the genus, on account of its being so well known, both in the larva and perfect state, while the larvæ of many of the others have not as yet been observed. The margin of the wings, and the central spot, are black tinged with yellow, the hind margin streaked with orange; there is a yellowish stripe on each side of the thorax; and the abdomen is black, with a purple gloss, and has three yellow bands; the anal tuft is black.

The Caterpillar of the Currant Clearwing (No. 4) feeds upon the pith of the common Currant-tree in May, and the perfect insect appears in June. The ten other species may be distinguished by the following briefly stated characters:—

1. *Trochilium Vespiforme* (the Clear Under-wing) is considerably larger than the preceding, being the largest of the genus; but, independently of its size, it may be known by the semi-transparent brown of the anterior wings. The body is black, with a black tuft, and it has three yellow belts like the preceding species. The male has the antennæ distinctly pectinated, and is said to have five belts.

2. *Trochilium Ichneumoniforme* (the Six-belted Clearwing). The front wings are very strongly bordered with brown, and have a mark across the middle, joining the front and back border. At the points, the border extends into the wing, forming a deep brown tip; the body and tuft are black, with six yellow belts, the female being seven-belted.

3. *Trochilium Cynipiforme* (the Yellow-legged Clearwing). The front wings of this species resemble those of the preceding, but the brown border is paler, and the insect is smaller. It may be more easily distinguished by the yellow collar round the head, and the yellow tuft at the tail. In the specimens I have seen, the black portion of the body had two yellow belts; those described with *four* are probably of the other sex.

4. *Trochilium Chrysidiforme* (the Fiery Clearwing). The fore-wings are broadly bordered with bright saffron colour, from which it takes its popular name. In the specimen I have seen, it has only one yellow belt, and the tuft is black.

5. *Trochilium Scholiæforme* (the Large Clearwing). This is one of the species recently added to our list; it was first taken near Llangollen, in North Wales. It is similar in size to *Vespiforme*, but distinguished from that insect by the black borders to the wings, and by a black bar across the centre, and a central wedge-like projection towards the base; it has two yellow rings round the black body, and the anal tuft is deep orange.

6. *Trochilium Sphægiforme* (the Black and White Horned Clearwing). The species may be at once distinguished by the white ring near the tip of the antennæ; the fore-wings are bordered with bluish-black, and the black abdomen has a yellowish band, and a very broad fan-like black tuft at the tail.

7. *Trochilium Allantiforme* (the Whitebelted Clearwing). This is one of the smallest species. It may be distinguished by being almost without the dark borders to the front wings, which are only marked with brown by a broad patch at the tips, and a central dot; the male has two nearly white belts round the black abdomen, and the tufted tail has a patch of orange in the centre.

8. *Trochilium Myopæforme* (the Red-belted Clearwing). This species may be readily distinguished from all the preceding by the *broad* red belt of the abdomen; the palpi are black.

9. *Trochilium Culiciforme* (the Large Red-belt). This species so closely resembles the preceding, that it can scarcely be distinguished, except in size, and by the colour of the palpi, which are dull orange, while those of *Myopæforme* are brown; it has also the inner margin of the fore-wings reddish at the base.

10. *Trochilium Formicæforme* (the Flame-tipped Red-belt). This species may be at once distinguished from the other "Red-belts" by the broad *red* tip of the anterior wings.

The genus *Trochilium* terminates the division termed *Sphingidæ*, or, as some still term it, *Crepuscularia*, including all the lepidopterous insects that have the antennæ thickened towards the tip, but not clubbed. We now proceed to the great division, "*Lepidoptera nocturna*," the first family of which is that of the *Hepialidæ*.

DIVISION I.—LEPIDOPTERA NOCTURNA.

THE FIRST FAMILY.—HEPIALIDÆ.

THE first genus of this family, *Hepialus*, is distinguished by the extremely short antennæ, as will be seen in the species selected for illustration. The Caterpillars are naked and grub-like in appearance, though regularly sixteen-footed. They feed on wood, and are found in the trunks or at the roots of trees.

No. 5, Plate 4, is the female of the Ghost-Moth, *Hepialus Humuli*, the extremely small antennæ of which are scarcely visible.

No. 6 is the male Ghost-Moth, which is white on the upper side, but brown beneath. Few other British Moths exhibit so extraordinary a difference in the markings of the male and female. The male, when it flies in shady places late in the deep twilight of summer evenings, has a singularly spectral appearance, seeming to vanish suddenly, when the dark-coloured under sides of the wings are presented instead of the upper. It is from this circumstance, or from its frequent appearance in churchyards, that it has received its popular name. It appears in the beginning of summer. The Caterpillar of the Ghost-Moth (No. 7) is a root-feeder, and is represented as feeding on the root of the Hop.

There are four other species of the genus *Hepialus*, all much smaller than the Ghost-Moth.

1. *Hepialus Hectus* (the Gold Swift). This pretty species is of a bright orange tone, with marks of pale gold colour, which have a metallic gloss, from which it has received its popular name. The colour and markings of the female are much deeper in colour, but entirely without the metallic gloss. It appears in June.

2. *Hepialus Lupulinus* (the common Small Swift). This unattractive species, though very similar to the preceding, is entirely without the metallic gloss in its markings of the male, and the female is of a dull ashy colour, with fewer light marks, and is sometimes entirely gray. It appears at the end of May.

3. *Hepialus Velleda* (the Beautiful Swift), is larger than the two preceding; and the front wings are much more evenly and beautifully variegated than those of any other species, from which it is sometimes called the Map-winged Swift. The female is of a warmer tone of colour than the male, but the fine markings are scarcely traceable. There is a variety with the map-like markings nearly obsolete, but having a group of whitish patches just beyond the centre of the fore-wings. This species is rather rare.

4. *Hepialus Sylvinus* (the Orange Swift), is not so finely marked as the preceding, but has the ground-colour of the fore-wings of a very rich orange. The male has the antennæ longer than any other species, and slightly pectinated. The female is of a duller but very pleasing brown tone, and much larger than the male, being nearly the size of the Ghost-Moth. A variety of this species occurs in which all four wings of the female are of an unvarying pinkish flesh colour. It appears towards the end of summer.

The next genus, containing a solitary British species, is *Zeuzera*. This genus is distinguished from *Hepialus* by the length of the antennæ, and by the broad bipectination of those of the male to about two-thirds of their length; those of the female being only slightly serrated.

No. 8, Plate 4, is the female of *Zeuzera Æsculi* (the Wood-leopard), a far handsomer and larger insect than the male, which is, however, similarly marked. It is one of the most remarkable of our British Moths. No. 9 is the Caterpillar of the Wood-leopard, which, like those of other *Hepialidæ*, feeds upon the interior of the trunks of various trees.

The next genus is *Phragmatœcia*, containing only one species, now of extreme rarity in England, though once well known in the Fens of Lincolnshire. The genus is distinguished by the deeply pectinated antennæ of the males; those of the female being ciliated to the point. The abdomen is slender, and of extraordinary length in the female.

Phragmatœcia Arundinis (the Reed-leopard), is in form not unlike the Wood-leopard, but the fore-wings are almost devoid of markings, and of a dark purplish ochre, the hind-wings being of a pale yellowish gray; the antennæ are pectinated in the males. The first specimen discovered was a mutilated one found by Mr. H. Doubleday in Epping forest. A few years afterwards it was taken rather plentifully in the Fens in Lincolnshire, but it has since disappeared; it is perhaps periodical in its appearance like several other species. A figure of this insect, with some others, will be given in a supplemental plate at the end of the work.

The next genus, *Cossus*, contains four European species, but only one British, which is, however, one of the largest of our native Moths. The antennæ of the males are long, and partially pectinated; those of the females being merely dentate.

No. 10, Plate 4, is *Cossus Ligniperda* (the Goat-Moth); and No. 11 the handsome Caterpillar, the dark

scales on the back of which shine as though varnished. This Moth remains three years in the Caterpillar state; the perfect insect generally appearing in June and July. It is an abundant species, but more rare in the North.

THE SECOND AND THIRD FAMILIES OF THE SUB-DIVISION LEPIDOPTERA POMERIDIANA.

As the present arrangement of the second and third families of this division has been departed from in the following plates, it may be as well in this place to give an outline of the system of arrangement adopted in those families in the collection of native *Lepidoptera* in the British Museum; to which I have added also that of the first family, the *Hepialidæ*, by way of making the arrangement more readily intelligible.

DIVISION II.—LEPIDOPTERA NOCTURNA.

SUB-DIVISION I.—LEPIDOPTERA POMERIDIANA.

FAMILY I.—HEPIALIDÆ, containing the following genera:—

1. Hepialus . . . The Swifts.
2. Zeuzera . . . The Wood Leopards.
3. Phragmatæeia . . . The Reed Leopards.
4. Cossus . . . The Goat Moth.

FAMILY II.—NOTODONTIDÆ.

SUB-FAMILY 1.—The PYGERIDI, containing the following genera:—

1. Phalera . . . The Buff Tips.
2. Clostera . . The Chocolate Tips.

SUB-FAMILY 2.—DICRANURIDI, containing the following genera:—

1. Cerura . . . The Puss Moths.
2. Stauropus . . . The Lobster Moth.

SUB-FAMILY 3.—NOTODONTIDI, containing the following genera:—

1. Notodonta . . The Prominents.
2. Pheosia . . . The Swallow Prominents.
3. Lophopteryx . . Various Prominents.
4. Plerostoma . . The Pale Prominent.
5. Ptilophora . . The Plumed Prominent.
6. Spatalia . . . The new species.
7. Drymonia . . The Marbled Browns.
8. Gluphisia . . The Dusky Marbled Browns.
9. Diloba . . The Figure-of-Eight Moth.
10. Petasia . . The Sprawlers.
11. Peridea . . The Great Prominent.

SUB-FAMILY 4.—ENDROMIDI, containing a single genus:—

Endromis The Kentish Glory.

FAMILY III.—BOMBYCIDÆ.

SUB-FAMILY 1.—ATTACIDI, containing a single genus:—

Saturnia The Emperor Moth.

SUB-FAMILY 2.—BOMBYCIDI, containing the following genera:—

1. Lasiocampa . . The large Eggar Moths.
2. Eriogaster . . The small Eggar.
3. Pœcilocampa . . The December Moth.
4. Trichiura . . . The Pale Oak Eggar.
5. Clisiocampa . . The Lackey Moths.

SUB-FAMILY 3.—LASIOCAMPIDI, containing the following genera:—

1. Odonestis . The Drinkers.
2. Dendrolimus . The Pine Lappets.
3. Gastropacha . The Lappets.


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PLATE V.

No. 1.—The Lobster-Moth (*Stauropus Fagi*).
No. 2.—The Caterpillar of the Lobster-Moth.
No. 3.—The Pebble Prominent (*Notodonta Zic Zac*).
No. 4.—The Caterpillar of the Pebble Prominent.
No. 5.—The Swallow Prominent (*Pheosia Dictæa*).
No. 6.—The Caterpillar of the Swallow Prominent.
No. 7.—The Coxcomb Prominent (*Lophopteryx Camelina*).
No. 8.—The Caterpillar of the Coxcomb Prominent.
No. 9.—The Pale Prominent (*Pterostoma Palpina*).
No. 9½.—Spatalia Bicolora—a new species.
No. 10.—The Lunar Marbled Brown (*Drymonia Chaonia*).
No. 11.—The Rannoch Sprawler (*Petasia Nubeculosa*).
No. 12.—The Female of the Rannoch Sprawler.

In selecting the specimens for this and a few of the succeeding plates, I have not strictly followed the exact order of the system which I have adopted, a table of which will, however, be found at page 16. At the close of the *Arctiidæ*, I shall also append a list, showing the order in which the collection of native *Lepidoptera* in the British Museum are at present arranged, up to the end of that family.

The genera illustrated in the present Plate are all of the recently formed family, *Notodontidæ*.

The genus *Stauropus*. In this genus the males have the antennæ pectinated nearly to the tips. The antennæ of the females are simple.

No. 1, *Stauropus Fagi*, is popularly known as the Lobster-Moth, from the singular form of the Caterpillar. The aspect of the Moth, however, presents none of those anomalous characters which one would be led to expect from the very unusual form of the larva. This insect is rare. The Caterpillar appears in the autumn, and the perfect Moth in the following July. There is no other British species in the genus *Stauropus*. Exeter, Blandford, Lewes, Dursley and other places, are cited as localities where *S. Fagi* has been recently captured.

The genus *Notodonta* has the antennæ pectinated in the males, and simple in the females. It contains three well-marked species.

No. 3, *Notodonta Zic Zac* (the Pebble Prominent) is the handsomest of the genus. The Caterpillar (No. 4) is remarkable, like that of *N. Dromedarius*, (which has received its specific name in consequence), for the singular humps upon the fifth and sixth segments. It is not an uncommon species, and appears in May and August. The Caterpillar feeds on the Poplar and Willow, and may be found both in June and September. There are two other species.

1. *N. Dromedarius* (the Iron Prominent) is rather larger, and not distinguished by the mass of deeper markings at the tips of the fore-wings, like that species. The ground colour is a dull deep brown, traversed by two narrow waved bands of a warm ochreous tone, with an irregular crescent-like mark of the same colour between them, as also some other ochreous spots close to the shoulder. The hind-wings are of a full dusky slate colour, traversed by two faint irregular bands of a lighter and warmer tone. The Caterpillar is green; a broad mark on the back extending only along the first three segments, and the legs are all rosy pink. The humps, from which the species takes its name, are yellowish. It is found on Oak, Poplar, Hazel, etc., in September, and the Moth appears in June and August. It was formerly thought rare, but is now frequently found by careful collectors.

2. *N. Tritophus* (the Dark Iron Prominent) is much like the preceding species, except that it is smaller, and the ground colour of the fore wings is rather of a slate colour than brown; the hind wings being dull buff, grayish at the edge, and with a cloudy gray band near the middle. The larva is dark green, with humps, and a reddish line from the head to the fifth segment. This species is very rare.

The genus *Pheosia* has the antennæ ciliated in the male, and simple in the female. It contains only two species.

1. *P. Dictæa* (the Swallow Prominent, Nos. 5 and 6), is by no means common, though it has been taken, on several occasions, near Dover, London, York, and other places. The Caterpillar is found on Poplar, Willow, and Birch, in June and October; the Moth appearing in June and August.

2. *P. Dictæoides* (the Lesser Swallow Prominent) closely resembles the preceding, but is generally darker, especially the hind-wings, which are nearly brown. It is also smaller. The Caterpillar is said to be pale green, and glossy, with a slender yellow lateral line, and underneath tinted with rose colour. It is rather more rare than *P. Dictæa*.

The genus *Lophopteryx* has the antennæ pectinated in the male, and simple in the female. It contains three species.

1. *L. Camelina* (the Coxcomb Prominent, Nos. 7 and 8) is at the same time the commonest and handsomest species. The Caterpillar has been variously described. That in the Plate is from Hübner's figure; but English entomologists describe it as greenish, with a yellow line along the spiracles, which are black, and each followed by a red spot, and having two tubercles on the twelfth segment tipped with red. It should be looked for in May and September, on Birch, Poplar, or Willow; the Moth appearing in May and August.

2. *L. Cucullina* (the Maple Prominent) is much smaller than the preceding. The ground colour of all four wings is a pale ochreous brown or buff, with a darker brown space towards the external edge, through which, in the front-wings, passes a narrow waved band of pale grayish white, spreading to a cloudy patch at the inner angle. In the hind-wings, a pale line of the ground colour passes through the deeper brown at the edge. The larva is green or pale reddish, with low humps on the middle segments, and a red-tipped double tubercle on the twelfth.

3. *L. Carmelita* (the White-Spot Prominent) is nearly as large as *L. Camelina*, but may easily be distinguished by the difference of colour. The anterior wings are deep cool brown at the front, and grayish at the back, having two conspicuous white marks on the front edge. The larva is green; the surface being tuberculated with raised yellow specks.

The genus *Pterostoma* contains only a solitary species. The antennæ are pectinated in both sexes, but more strongly in the male. The palpi are of unusual length, as will be seen by reference to the figure.

P. Palpina (the Pale Prominent) is represented at No. 9. The Caterpillar is without the humps or tubercles of the preceding genera, and is green, with several pale lines, and freckled with black along the back, etc. It is not rare, and is found in woods round London in May and September.

Spatalia. In this genus the antennæ are pectinated in the males, and slightly ciliated in the females.

Spatalia Bicolora (No. 9½). The only British species has been discovered since the first issue of this work. It was taken in the South of Ireland by Mr. Bouchore last summer (1858). A fuller description of this insect, and other novelties, will be given at the close of the second volume, accompanied by illustrations in a supplemental plate.

The genus *Drymonia* contains two species. The antennæ are pectinated only in the male.

1. *D. Chaonia* (the Lunar Marbled Brown, No. 10) is distinguished from the other species by the presence of a dark spot in the centre of the light portion of the front wings. The Caterpillar is green, with yellow lateral and dorsal lines, and is found on Oak, Birch, and Hazel, in September; the Moth appearing in May and June. It is rather rare, but its recent capture is recorded at Bristol, Epping, and other places.

2. *D. Dodonea* (the Marbled Brown) is without the black mark alluded to in the preceding species; all the bands of brown being less solid, and the whole colour much paler, except the markings near the base of the front wings; in this respect, however, the specimens are very variable. The Caterpillar is pale green, with a gray dorsal line and blue head, and a yellow lateral line spotted with red. It is found in September, and the Moth in May and June, but is rather rare. The woods near London appear to be its favourite resort.

The genus *Petasia* contained but one native species till the recent discovery of the handsome *P. Nubeculosa* in the Birch woods of Perthshire. The antennæ are pectinated only in the male.

No. 11 is the male of the *Petasia Nubeculosa* (the Rannoch Sprawler), and No. 12 the female, drawn from


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the fine specimens now in the British Museum. The larva is green, with raised whitish dots, a whitish streak on the fourth segment, and a slender yellow band across the twelfth. It feeds on Birch and Elm, and when in repose raises the three first segments nearly erect, like some of the *Sphingidæ*. It is from some of the positions of the Caterpillar that the Moths of this genus have been popularly termed "Sprawlers."

The old species, *P. Cassinea* (the Sprawler), is very much smaller than the preceding. It is pale grayish brown, with a dark streak from the base along the middle; and towards the margin are several short black streaks and a few whitish marks. The hind-wings are pale buff, with a brown mark near the centre. The Caterpillar is bright green inclining to yellowish, with white lines along the back, and lateral lines of pale yellow meeting it at the anal prominence. It feeds on forest trees in May, and the Moths appear in September.

The three following genera I shall describe without illustration, in order not to exceed the number of Plates to which this volume is restricted :—

In the genus *Ptilophora*, the males have pectinated antennæ of peculiar and feathery character, from which the specific name of the only species, *Plumigera*, is derived. *P. Plumigera* (the Plumed Prominent) measures about an inch and three-quarters across the wings, which are narrow, and resemble in form and colour those of the *Hepialidæ*. The body and fore wings are of a warm ochre, with a slight flush of purple, and there are two narrow transverse bands of a paler ochre. The hind-wings, which are sometimes rather pinkish, are slightly marked with waved bands of a darker tone. The female has the antennæ only slightly serrated. The Caterpillar is greenish, with a slate-coloured stripe along the back, and several pale streaks at the sides. It feeds on Maple, etc., in May, and the Moth appears in October and September. It is a rare species.

In the genus *Gluphisia*, the antennæ are broadly pectinated in the male, and slightly in the female. The only species, *G. Crenata* (the Dusky Marbled Brown), does not exceed an inch and a-half in the expanse of the wings, which are of a pale pinkish brown, with a broad deep brown band of much deeper colour across the middle, and waved narrow bands of the same tone near the margin. Their hind wings, of the same tone as the front, are but very slightly marked with deeper brown. The Caterpillar is pea-green, with dorsal and lateral stripes of a paler colour. It is found in August on the Black Poplar.

In the genus *Diloba*, the antennæ are long and bipectinated in the male, and simple in the female. The only British species is a small Moth, about one and a-half inch in expanse. *Diloba Cæruleocephala* (the Figure-of-Eight Moth) is of a fine ashy-gray, blue about the head and thorax, from which it derives its specific name. The gray ground colour of the wings becomes brownish at the tip and base. Across the centre, leaving a broad space between, are two angulated black lines, with faint cloudy bands beyond. Between the black lines are white marks, somewhat in the form of a figure of 8, from which it derived the popular name, the Figure-of-Eight Moth. The Caterpillar is lead-coloured, streaked with pale yellow lines, and conspicuously spotted with black. It feeds on the Sloe, in May, and the Moth appears in August.

PLATE VI.

No. 1.—The Great Prominent (*Peridea Trepida*).

No. 2.—The Caterpillar of the Great Prominent.

No. 3.—The Kentish Glory (*Endromis Versicolor*). The Male.

No. 4.—The Female of the Kentish Glory.

No. 5.—The Caterpillar of the Kentish Glory.

No. 6.—The Emperor-Moth (*Saturnia Pavonia-Minor*).

No. 7.—The Caterpillar of the Emperor-Moth.

No. 8.—The Oak Lappet (*Gastropacha Quercifolia*).

No. 9.—The Oak Lappet, showing the position of the wings at rest.

No. 10.—The Caterpillar of the Oak Lappet.

No. 11.—The Small Lappet (*Gastropacha Ilicifolia*).

No. 12.—The Caterpillar of the Small Lappet.

THE Moths in Plate 6 belong to the two families *Notodontidæ* and *Bombycidæ*, but are taken out of the usual order to facilitate the grouping in the Plates. The order in which they are arranged in the collection of Native *Lepidoptera* in the British Museum will be given, as before stated, in a classified list, for reference, inserted at the end of the *Arctiidæ*.

The genus *Peridea* is distinguished from the other genera of *Notodontidæ* principally by its superior size. The antennæ are bipectinated in the males. The fore-wings have a slight projection from the inner margin. The Caterpillar has no protuberances. There is but one British species.

Peridea Trepida (the Great Prominent, No. 1) appears in May and June, but is not common. The Caterpillar, No. 2, is found on Oak in August and September. It has been captured recently at Manchester, York, Epping, and other places.

The remarkable genus *Endromis* belongs to a separate sub-family of *Notodontidæ*, termed *Endromidi*, as exhibiting some very distinctive characters ; such as its remarkably large size, and the semi-transparent character of its broad and finely marked wings. The antennæ are bipectinated both in the males and females.

Endromis Versicolor (the Kentish Glory) is represented at No. 3 and 4, 3 being the male and 4 the female. Till within the last few years, this fine Moth has been considered one of the choice rarities of an English collection ; but it has lately been taken in such numbers in the Rannoch Woods, near Perth, that it is now found in every cabinet, though as rare as ever in its old haunts in Kent, and a few other southern counties. It appears in April. The Caterpillar of the Kentish Glory (No. 5) feeds on Birch, Lime, and Hazel, in June and July.

The genus *Saturnia* belongs to the family, *Bombycidæ*, according to the arrangement of the collection in the British Museum. The antennæ in this genus are four-pectinated at each joint. The larvæ of the European species are naked ; each segment being furnished with a ring of tubercles emitting tufts of short bristly hairs.

No. 6, Plate 6, is *Saturnia Pavonia-Minor*, so named to distinguish it from the *S. Pavonia-Major* of the Continent of Europe and of America. It is one of our handsomest Moths, and by no means rare, being very generally and rather plentifully distributed. The female is larger than the male, but the markings and general colouring are paler. It is subject to extreme variations of colour ; Mr. Bond, whose fine collection is well known, having a specimen in which the fine ringed spots or ocelli are entirely absent, leaving the large cream-coloured space, in which they are generally found, entirely without mark. It appears in May, and again in August. The Caterpillar of the Emperor-Moth, No. 6, is often found on Heather in the autumn, and sometimes on Apple and Willow trees. This insect, as stated, is common, and very generally distributed.

The genus *Gastropacha* also belongs to the family *Bombycidæ*. It is distinguished by strongly curved and pectinated antennæ in both sexes. The remarkable effect produced by the dilated margins of the hind wings extending beyond the fore wings when the insect is at rest, has been thought to give to them the appearance of brown leaves, and hence the specific names, *Quercifolia* and *Ilicifolia*. The Caterpillars have singular velvety bosses on the second and third segments, from which issue long and slender tufts of hair ; the first and last segments having similar tufts of hair, but not the velvety bosses.

Gastropacha Quercifolia (the Oak, or Oak-leaf Lappet-Moth, No. 8) appears in the beginning of July. At No. 9 the same insect is represented at rest, showing the singular effect of the extension of the hind-wings beyond the anterior ones. The Caterpillar of the Oak-leaf Lappet-Moth (No. 10) feeds on Grasses as well as Trees, and is found in May and June. It is widely distributed.

G. Ilicifolia (the Small or "Scarce" Lappet-Moth, No. 11). This species (though long reported as British) has been extremely scarce till within the last few years. The three specimens in the British Museum, from one of which (a female) my drawing was taken, are all remarkably beautiful. The Caterpillar of *G. Ilicifolia* (No. 12) feeds on the Sallow in June and July, and passes the winter in the pupa state, the Moth appearing in the following May. It is found in high moorland districts, and its recent capture is recorded at Cannoch Chase and near Sheffield.

G. Populifolia, another species, as large as *G. Quercifolia*, was formerly reported as British, but is no longer found in our catalogues. If, however, any collector should meet with it, he may know it by its bright light ochreous colour, and the less curved antennæ, which at once distinguish it from *G. Quercifolia*.

For the systematic order of the genera illustrated in this and the preceding Plate, see page 16.


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PLATE VII.

No. 1.—The Pine Lappet (*Dendrolimus Pini*).
No. 2.—The Caterpillar of the Pine Lappet.
No. 3.—The Buff-tip (*Phalera Bucephala*).
No. 4.—The Caterpillar of the Buff-tip.
No. 5.—The Puss-Moth (*Cerura Vinula*). The female.
No. 6.—The Caterpillar of the Puss-Moth.
No. 7.—The Dark-barred Kitten (*Cerura Bicuspis*).
No. 8.—The Caterpillar of the Dark-barred Kitten.

THE genus *Dendrolimus*. The insects assigned to this genus differ from those assigned to the genus *Gastropacha*, in having the front wings much straighter at the fringed edge, and forming an angle towards the posterior edge, instead of being rounded off; and they have a white stigma-like central spot. Both pairs of wings are also without the denticulated margin which distinguishes the other section of the Lappets. Some entomologists, however, unite this genus with *Gastropacha* on account of the generic affinity of the Caterpillars. There is but one British species.

Dendrolimus Pini (the Pine Lappet, No. 1) is so rare that many of our entomologists do not consider it a British species, and its name is not found, therefore, in their lists. However, as there is a male specimen in the cabinet of native *Lepidoptera* in the British Museum, from which this drawing was made, and the capture of which appears tolerably well authenticated,* I should not consider my work complete without a figure of this handsome insect. The female is much larger, and paler coloured than the male. The Caterpillar (No. 2), which is remarkably handsome, feeds on Pine, and one was taken on the fir-trees in Richmond Park by Wilkes, the well-known entomologist, in 1748. It probably attains its full growth towards the end of June, as the perfect insect appears in July.

The genus *Phalera*. In the arrangement adopted in the British Museum, this genus is placed immediately after the *Hepialidæ*, forming, along with the genus *Clostera*, the sub-family *Notodontidæ*, as will be seen by reference to the table at page 16. The antennæ of the males are obtusely pectinated; those of the females simple. The fore-wings are marked at the tips by a broad rounded patch of pale buff. The Caterpillar is downy and without protuberances. The Chrysalis is subterranean. There is only one British species.

Phalera Bucephala (the Buff-tip, No. 3). This is one of the handsomest of our common Moths. Its popular name, the Buff-tip, is so characteristic, that it is not likely to be altered; but the scientific name of the genus has been subject to many changes. Putting the earlier generic denominations out of the question, it has had five since 1810. *Pygæra*, *Phalera*, *Sericaria*, *Acrosema*, and lastly *Hammatophora*, the name conferred by Mr. Westwood, in my "British Moths and their Transformations." Hübner's name, *Phalera*, published in 1816, appears, however, to be finally adopted, and the specific name *Bucephalus*, or Bull-headed, the original name assigned by Linnæus (*Phalæna Bucephala*) has never been disturbed, except by Retz, who called it *Phalæna Lunata*, in allusion to the moon-like discs of pale cream-colour, or rather pale buff, which form such conspicuous marks at the tips of the wings. The Caterpillar (No. 4) is found in the autumn on Oak, Elm, and other trees. It hybernates in the pupa state, and the perfect insect does not appear till the following June.

The genus *Cerura*. The insects assigned to this genus have the antennæ pectinated in both sexes, but most strongly in the males. The fore-wings have no projection on the inner margin, like those of the *Notodon-*

* It is said to have been taken by Mr. Sparshall in the Norwich Hospital, on the 22nd of July, 1809.

tidi; and are generally white or pale pearly gray, and semi-transparent with various well-defined markings. The Caterpillar has the posterior legs wanting; and they are replaced by two singular tail-like appendages. The Chrysalis is formed in a hard cocoon, attached to the bark of the tree upon which the Caterpillar has fed. The genus *Cerura*, with *Stauropus*, form the second sub-family of *Notodontidæ*, see page 16.

Cerura Vinula (the Puss-Moth, No. 5). This fine insect is as remarkable in the larva, as in the perfect state, and has often been minutely described by our old naturalists. The soft gray colouring and the brindled markings resemble those of a tabby cat, from which resemblance its highly characteristic popular name has arisen. The long, soft hair of the body adds greatly to the fancied likeness, and the clothing of the wings, too, assumes the appearance of a nap of short, close hairs, instead of the usual appearance of the ordinary "scales," which in the Buff-tip just described are of a positive scale-like form and texture. The male is smaller than the female, and has the antennæ much more strongly pectinated. The Caterpillar (No. 6) feeds on Willow and other trees. The tail-like appendages which supply, in the curious larva of this insect, the place of the usual anal feet, are, as it is supposed, a means of defence, as they form tubes from which the creature is enabled to put forth long filaments, which the Caterpillar can move about with great activity, and they possibly serve to keep off the attacks of Ichneumons.* There is a fine variety of this Moth sometimes made a species, under the name of *Erminia*, from the somewhat more ermine-like markings of the thorax, and small elongated touches of black at the sides of the abdomen.

There are also three other distinct species, all very much smaller, and popularly termed "Kittens" on that account :—

1. *Cerura Bicuspis* (the Dark-barred Kitten, No. 7) is extremely rare. The Moth appears in July, so that the Caterpillar (No. 8) must be sought in June, or late in the autumn. It has been found in Kent, and in the neighbourhood of Dublin. My drawings of this Moth and its larva were taken from foreign specimens.

2. *Cerura Furcula* (the Kitten) very closely resembles the preceding species, and is nearly as common as *Bicuspis* is rare. It differs from the last-named species in having the dark band broader and more regular, and in being almost without the markings in the white space between the broad dark band in the centre of the wing, and the irregular band towards the edge. Its specific name, *Furcula*, refers to the upper nervure or vein of the hind-wings, which is described as forked in this species, while it is simple in *Bicuspis*. The Caterpillar is similar in form to that of the other small species of *Cerura*, but is distinguished by a red patch at the back of the head and in the middle of the back, both bordered with yellow, and in the form of what has been called the "saddle" in the Caterpillar of the large species, *C. Vinula*. The description of this Caterpillar is taken from a beautifully prepared skin, furnished by Mr. Gardner, the well-known Naturalist of 51, High Holborn.

3. *Cerura Bifida* (the Barred Kitten). This species is very rare, but less so than *Bicuspis*, being occasionally found in the neighbourhood of London. It has the central dark band of the front-wings rather narrower than the other species, with five irregular spots beyond, and the band near the external margin is very pale. It has the first nervure of the hind-wings more deeply forked than *Furcula*. The Caterpillar is variously described by different authors, there being evidently some confusion in assigning the respective Caterpillars to the smaller species of *Cerura*. It is most probable that the Caterpillar, which has the red "saddle" descending quite down to the legs, is that of *C. Bifida*.

Four other species have been reported as native, but they are no longer found in British catalogues, and it is most probable that they are Continental varieties.

* The generic term *Cerura* is founded upon this singular formation, from the words κερας, a horn, and ουρα, a tail—meaning horn-tailed.


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PLATE VIII.

No. 1.—The Small Chocolate-tip (*Clostera Reclusa*).
No. 2.—The Caterpillar of the Small Chocolate-tip.
No. 3.—The Oak Eggar-Moth (*Lasiocampa Quercus*).
No. 4.—The Female of the Oak Eggar-Moth.
No. 5.—The Caterpillar of the Oak Eggar-Moth.
No. 6.—The Small Oak Eggar-Moth (*Trichiura Cratægi*).
No. 7.—The Caterpillar of the Small Eggar-Moth.
No. 8.—The December-Moth (*Pœcilocampa Populi*).

THE genus *Clostera* contains three British species. The antennæ are bipectinated in both sexes; the anterior wings are rather short, and somewhat square at the external margin, though rounded off near the hind-wings. They have all a large patch of chocolate colour towards the tip of the front-wings, from which they derive their popular name. The Caterpillars form a web, in which they reside, and in which the chrysalis is formed.

The first species, *Clostera Reclusa* (No. 1), is the smallest of the genus, and the chocolate patch, which does not quite extend to the tip of the wing, has within it a smaller one of brightish orange. The Caterpillar (No. 2), which is represented without its web, feeds on Aspen or Willow, beneath the bark of which it sometimes takes shelter in the autumn; and the Moth appears in the following June, July, or August. It is a rare species, but is widely distributed, being sparingly found in woods in various parts of the country.

2. *Clostera Anachoreta* (the Scarce Chocolate-tip) is thought by some to be a Continental species; but as the specimens in the British Museum are well known to have been captured by the late Mr. Spratt near Salisbury, it cannot be struck out of our lists; and it is probable that, though extremely rare, other specimens may yet be taken. It very closely resembles *C. Reclusa*, but is considerably larger; the patches of chocolate at the tips of the front-wings enclose three orange dots, and behind them is a well-defined black spot. The Caterpillar, as described by Continental authors, is gray, with a row of brown spots at the sides, and two black lines down the back, with fulvous dots. It is distinguished also by a conspicuous tubercle of bright brown on the fourth and on the anal segments. It feeds on Willow and Poplar, and is found in June and October, the early brood producing the perfect Moth in July, and the second not till the following May.

3. *Clostera Curtula* (the Chocolate-tip). This insect was very frequently taken by our entomologists of the last generation, but it appears to have become very scarce. It is the true Chocolate-tip of the old collectors. The chocolate patch is indeed much larger and more accurately defined than in the preceding species, being nearly enclosed by a somewhat irregular whitish line. It is also entirely brown, without spots of orange, is of a rich chesnut tone in fine specimens, and very much in the form of the pale yellowish mark of similar character in the Buff-tip. The Caterpillar is ashy-coloured, with four rows of dots of a deep orange colour, and on the back are two small black tubercles, one on the fifth and one on the twelfth segment. It is found in autumn on Willows and Poplars. The Chocolate-tips are grouped with the Buff-tip in the Museum collection, see page 16.

The genus *Lasiocampa* contains some of our largest native insects, especially the *Oak-Eggar*, so named from the compact oval cocoon formed by the Caterpillar. The antennæ are conspicuously bipectinated in the males, and serrated in the females. The males fly with amazing rapidity by day. The Caterpillars are covered with tufts of silky hair, as indicated in the generic name, derived from the Greek.

Lasiocampa Quercus (the Oak Eggar-Moth, No. 3). This is a very abundant species, and yet, though one of our handsomest Moths, neither its habits, nor the curious variations in its markings, which some have thought to constitute separate species, have been as yet satisfactorily studied. There is a tolerably common variety of the male in which the pale ochre extends to the edge of the wings entirely without a dark border; and a dark variety of the female which has a dark border corresponding to that of the male (No. 3), but these marks are seldom found in both the males and females in the same locality. The dark male, moreover, is very common, while the dark female is very rare. The common female (No. 4), of nearly uniform ruddy ochre, is the kind found near London; the dark ones being generally those taken in Cornwall or Scotland. It is said that the Caterpillar lives for twelve months before it forms its cocoon, but I have never met with it in a state of hybernation. The only way to secure male specimens, the flight of which is extremely rapid, is to take a freshly-expanded female to any likely wood, when the males will approach so boldly that they may be easily captured. They have been known even to enter the coat-pocket in which the box containing the female was deposited.

Lasiocampa Rubi (the Fox-Moth) is nearly as common as the previous species. It is not so large, and the wings are of narrower proportion, the general colour being a pinkish ochre, with a broad imperfect band of a darker colour running across the anterior wings; the hind-wings are darker and pinker, and entirely without mark. The Caterpillar is hairy, and when young is nearly black, with gold-coloured rings at the joining of the segments; when full grown, it assumes a deep, full rust colour, the joints of the segments being of a velvet black. It forms a spacious, somewhat crescent-formed, and semi-transparent cocoon, in which the chrysalis has the power of moving from one end to the other. The male Moth is smaller than the female, and rather more warmly coloured.

Lasiocampa Trifolii (the Grass-Eggar) is still smaller than the Fox-Moth, being about two inches in the full expanse of the wings, while the Fox-Moth attains two inches and a-half, and the female of the Oak-Eggar more than three inches. The ground colour of the wings of the Grass-Eggar is a rusty grey, with a narrow waved band of light straw-colour running across the wings somewhat beyond the centre. Within this band the general tone is rather darker, and near the centre is a kidney-shaped white spot bordered with black. The waved straw-coloured band frequently extends across the hind-wings in the male, but seldom in those of the female. The Caterpillar is generally found in the early summer months feeding on trefoil and other herbaceous plants. It is considered a sea-coast species, but is found in some places in the New Forest. It is hairy, like those of the other species, and of a dull brown, the joints of the segments being black, and speckled with dots of bluish-white.

The genus *Trichiura*. This genus is distinguished from *Lasiocampa* by the smaller size of the insects, and their shorter wings; also by their short straight antennæ, pectinated in the males, and ciliated in the females. In the female the tail is furnished with a dense mass of wool, from which peculiarity the generic name has been formed from two Greek words. The female uses this wool to clothe and protect her eggs, which she deposits in rows on the bark of trees. The Caterpillars are much less hairy than those of the genus *Lasiocampa*. There is only one British species in this genus.

Trichiura Cratægi (No. 6) has been popularly called the Small Oak-Eggar, from the nature of the cocoon formed by the Caterpillar, which much resembles, on a smaller scale, that of the Oak Eggar-Moth; but the larvæ feed in preference on the hawthorn, from which the specific name is derived. The female is generally of a darkish-brown colour, but a pale variety occurs marked like the male. The Caterpillar (No. 7) is found in May, and the Moth appears in September. It is rather rare.

The genus *Pœcilocampa* is distinguished by semi-transparent wings, and by the antennæ of the males, the bipectinations of which are nearly of the same width to the tip, while those of the female are simple. The Caterpillars are but slightly hairy, and rather depressed, and they form a compact and somewhat oval silky cocoon under ground. There is but a single British species.

Pœcilocampa Populi (the December-Moth, No. 8) does not appear till the end of November or December, as its popular name implies, when it forms, with other winter Moths, as Mr. Haworth remarks, an essential part of the food of some of our soft-billed birds. The Caterpillar is of an ashy tone, mottled with markings of deep ochre, getting darker on the back. There is a dark grey band on each side, spotted with dots of white, and two red spots in each segment; and there are two larger red marks on the second segment. It is found feeding on the Poplar and other trees in June; at a later season it may be found in the interstices of the bark.


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PLATE IX.

No. 1.—The Black Arches-Moth (*Lymantria Monacha*).
No. 2.—The Female of the Black Arches.
No. 3.—The Caterpillar of the Black Arches.
No. 4.—The Drinker-Moth (*Odonestis Potatoria*).
No. 5.—The Caterpillar of the Small Eggar (No. 9).
No. 6.—The Caterpillar of the Drinker-Moth.
No. 7.—The Lackey-Moth (*Clisiocampa Neustria*).
No. 8.—The Caterpillar of the Lackey-Moth.
No. 9.—The Small Eggar (*Eriogaster Lanestris*).
No. 10.—The Female of the Drinker-Moth (No. 4).

All the Moths in this Plate are of the family *Bombycidæ*, with the exception of the *Lymantria Monacha*, which belongs to the *Arctiidæ*. For the sequential arrangement adopted in the British Museum, see page 16.

The genus now called *Lymantria* is the *Psilura* of Stephens, Hübner's original name having been eventually preferred. This genus, though seemingly allied to some recently described, is yet in some respects very distinct, as in the elongated abdomen and ovipositor of the female; also in the habit of leaving the eggs uncovered after they are deposited, instead of covering them with the fur taken from the body of the parent.

Lymantria Monacha (the Black Arches, No. 1) is the only English species. It is a remarkably handsome insect, and is by no means rare, especially in the south of England. The male has the antennæ strongly bipectinated; the female (No. 2), which is much larger, having them simply ciliated. The Caterpillar (No. 3) feeds upon Scotch Fir, Bramble, Birch, Apple, etc., and is found in June and July; the Moth appearing in August.

The genus *Odonestis* is distinguished by the long and pointed palpi, which have the appearance of a kind of beak; also by the gently waving external margin of the anterior wings and their pointed extremity, and by the disparity of the male and female; the male being much smaller and with a tufted tail, while the body of the female is much more robust and not tufted. The antennæ of the male are very strongly, while those of the female are but slightly, bipectinated. There is but one English species.

Odonestis Potatoria (the Drinker-Moth, No. 4) is a very handsome and very common insect; the conspicuous Caterpillars being found on every bank as soon as the grasses and other spring foliage appear, to furnish it with suitable food. The male (No. 4) is much more richly coloured than the female; while the female (No. 10) has the advantage in size. In rearing broods of Caterpillars, female specimens are obtained much more frequently than males. The Caterpillar (No. 6) is full grown in June, and the Moth appears in July.

The genus *Clisiocampa* has received its name from the gregarious nature of the Caterpillars, the term being formed of two Greek words, which have reference to Caterpillars of that habit. The two English species are both popularly termed Lackey-Moths, in allusion to the gay colouring of the larvæ, which are striped with lines of many colours, like the lacings of a rich livery. The females of this genus arrange their eggs in the form of bracelets of small beads round the branches of trees, the foliage of which forms suitable food for the Caterpillars. The males have the antennæ pectinated, the females only ciliated. There are two British species.

Clisiocampa Neustria (the Common Lackey-Moth, No. 7) is very abundant everywhere, though not often seen, as it is almost exclusively a night-flyer, and is remarkably swift on the wing. The Caterpillars are, however, but too frequently seen in our gardens, where they are most destructive, and the best way of obtaining good specimens of the perfect insect is to rear them from the larva. The female is rather larger than the male,

but both sexes are remarkably small in proportion to the Caterpillar, which, when well fed, often attains a large size. No sooner do the leaves appear in spring upon our fruit-trees than these destructive larvæ appear, the eggs being invariably hatched at that season. They do not disperse when hatched, but form for themselves a web, which encloses a portion of the tender budding foliage for the use of the colony in general. This web is enlarged as the foliage is consumed and the Caterpillars increase in size, till at last many a devoted tree is completely enclosed, presenting an appearance the reverse of agreeable to the gardener. Trees, if not protected, are often killed by the devastations of two or three broods of this destructive larva. It is probable, although they appear to consume the foliage within their web, that they occasionally, after they attain a certain size, disperse at night to seek other food, returning to the web at daybreak. The Caterpillar (No. 8) is so variously coloured, and its delicate stripes of gray, blue, orange, white, etc. so numerous, that a really accurate representation is almost impossible. The dorsal line is generally pure white ; to this succeeds an orange line followed by a stripe of black and a stripe of blue, after which the orange stripe is repeated, followed by one of a pale silvery blue. In the silvery blue stripe black dots occur on the third, fourth, and twelfth segments. The hairs are dark brown above, and orange towards the legs. When about to change to the pupa state, these Caterpillars form a very pretty yellowish cocoon, which appears powdered with flakes of dust of a pale sulphur colour. The Moth appears in July.

Clisiocampa Castrensis is popularly termed the "Ground Lackey," as the Caterpillar, instead of feeding upon trees, is found near the ground upon such plants as *Plantago Lanceolata* and *Daucus Carota*. This species is exceedingly like the preceding, both in size and colour, but may be distinguished by the paler and yellower colour of the thorax, which is often dark fawn-coloured, in *C. Neustria*. The wings, too, are more ruddy in their tone, though in that respect both species vary very considerably. It is more distinct from *C. Neustria* in the Caterpillar stage, which has been well described by Mr. Stainton, than in the perfect insect. The Caterpillar of *C. Castrensis* has the white line down the back much less clear and distinct than that of *C. Neustria*. Below this is a broad stripe of rich orange brown, and then a narrower stripe of delicate whitish grey, in which, on the third, fourth, fifth, and twelfth segments, is a black spot, while the larva of *C. Neustria* has no spot on the *fifth* segment. The hairs are *all* golden brown, while in the larva of *C. Neustria* they are, as stated above, dark brown on the upper part of the body, and only golden brown just above the line of the legs. The hairs, too, are decidedly longer than those of *C. Neustria*.

In the genus *Eriogaster* we have but one British species. The bodies of the females in this genus are terminated by a thick, woolly mass, which is used by the parent to clothe and protect the eggs. The wings are but thinly clothed with scales, so that they have a slightly transparent appearance. The antennæ are bipectinated in the males, and serrated in the females. The larvæ are gregarious, inhabiting a common web ; but when about to change to the pupa state, they disperse, and each forms its own cocoon, of compact, oval form, among dry rubbish or dead leaves.

Eriogaster Lanestris (the Small Eggar, No. 9) has received its popular name from the egg-like appearance of its cocoon, and its systematic specific name, *Lanestris*, from the woolly character of the body. Except in their simply serrated antennæ and the woolly tuft at the tail, the females closely resemble the males, though they are generally rather larger. The Caterpillar (No. 5) feeds on Sloe, White-thorn, and other trees, and is generally found about the end of June. It is said that, though residing in a common web, they disperse at night to feed, returning to their web before daylight, until they finally separate for the purpose of forming their cocoons. This species passes the winter in the pupa state, the perfect insect appearing in March or April, but it sometimes remains two or three years in the chrysalis. It is not very rare.

The whole of the Insects in Plates VII., VIII., and IX. have been drawn from specimens furnished by Mr. Gardner, of High Holborn, who has always on sale a number of fine specimens of British *Lepidoptera*.


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PLATE X.

No. 1.—The Gipsy (*Hypogymna Dispar*).

No. 2.—The Female of the Gipsy.

No. 3 —The Caterpillar of the Gipsy.

No. 4.—The Light Tussock (*Dasychira Pudibunda*). The Male.

No. 5.—The Caterpillar of the Light Tussock.

No. 6.—The Nut-tree Tussock (*Demas Coryli*).

No. 7.—The Caterpillar of the Nut-tree Tussock.

No. 8.—The Scarce Vapourer (*Orgyia Gonostigma*).

No. 9.—The Female of the Scarce Vapourer.

No. 10.—The Caterpillar of the Scarce Vapourer.

THE fourth family of our native Moths, according to the arrangement of the collection in the British Museum, is that of the *Arctiidæ*. The first sub-family of which, in the same system, is termed the *Liparidi*. One genus of this sub-family, *Lymantria*, was described in Plate IX., before some of the last genera of *Bombycidæ*. The present Plate contains four other genera of the first sub-family of the *Arctiidæ*. For the sequential arrangement of the *Arctiidæ*, see page 28.

Hypogymna Dispar (the Gipsy, No. 1) is a genus remarkably like *Lymantria* for the disparity of size in the male and female, as the specific name imports. The popular name of the Gipsy was no doubt suggested by the brown, tanned kind of colour of the male, which is always much deeper toned, as well as much smaller than the female (No. 2), the ground colour of which is generally of a yellowish white tinted with buff. The Caterpillar (No. 3) appears from June to August, and feeds on many different kinds of trees. It is found plentifully in fenny districts, but is not generally common; on the Continent, however, it is occasionally a real pest, from its vast numbers, stripping the trees of whole districts. There is only one British species.

The genus *Dasychira* contains two native species, and belongs to that section of this sub-family, of which the Caterpillars are termed Tussocks, from the close, massive tufts of silky hairs emitted from some of the anterior segments of the body.

Dasychira Pudibunda (the Light Tussock, No. 4) is a common but handsome insect, the female being often near twice the size of the male. The female differs also from the male in the slender and simple antennæ, and in the lighter and grayer colour of the wings. The Caterpillar of this species (No. 5) is remarkably beautiful, being thickly clothed with spreading silky hairs of a delicate straw-colour, the divisions of the segments showing folds of deep, velvety black. From several of the anterior segments issues a compact tuft of hairs of a deep yellow, so massively packed, and of such equal length, that they appear cut through at the top, which exhibits a dense flat surface. There is also a tuft of a dull reddish colour issuing from the twelfth segment, which is, however, conical instead of flat at the apex, and points backwards, like a kind of tail. It is from this last feature that when occasionally found in considerable numbers in Hop-grounds, it is called the Hop-dog. This Caterpillar is found in the autumn, and the perfect insect appears in the following May and June. It is common, and very generally distributed.

Dasychira Fascelina (the Dark Tussock). This species, in the perfect state, is very much like *Pudibunda*, but is generally much darker in colour, and there is not so much difference either in size or colour between the sexes. The Caterpillar is very distinct in appearance—the whole of the skin of the body being black, which gives a deep tone to the yellow hairs, while the Tussocks, instead of being of a deeper yellow, like those of *Pudibunda*, are of the same deep black as the skin. It feeds on various plants, and is found most frequently in open situations, such as heaths, commons, etc. It appears in autumn, and is sometimes found all through the winter; the Moth appearing in the following July.

The genus *Demas*. The insects assigned to this genus have the antennæ of the males slightly pectinated; those of the female filiform; the thorax crested; the fore legs not hairy. The Caterpillars have tufts of hair. There is only one British species.

Demas Coryli (the Nut-tree Tussock, No 6). The markings of this insect vary considerably in different specimens. The Caterpillar (No. 7) feeds on Birch and Hazel in May and September, being double brooded; and the Moth appears in April and July. It occurs in woods near London and other parts of the country, and has been recently taken in some abundance at Epping.

The genus *Orgyia* contains two British species, one very common and the other extremely rare. It may be at once distinguished from the previously described genera by the remarkable character of the females, which are almost entirely wingless, and would not be recognised as Moths, except by those acquainted with, at all events, the rudiments of entomology.

The common species, *Orgyia Antiqua* (the Vapourer), is seen in abundance every season, and, as their ordinary time of flying is by day, they are among the first of our common Moths that become known to a young collector; their fitful rising and falling flight, which might be described as "vapouring," has originated their popular name, for it could not fail to be generally remarked, as this pretty little Moth is so bold that he does not continue his promenades to the fields and gardens, but pursues his excursions into the midst of our most densely built towns and cities. The Common Vapourer is brown, with one white spot near the posterior angle of the front-wing. Although the male Moth is so well known, few, except professed entomologists, are acquainted with the female—a heavy, wingless creature, of a dull gray colour, entirely unlike its winged and warmly tinted mate, as may be seen by the representation of the female of the second species, *O. Gonostigma* (No. 9). The Caterpillar is very handsome, and is found on all kinds of plants, especially rose-trees, throughout the summer. It is of a darkish brown colour, varied with spots of bright red, and has compact tussocks, or tufts of whitish hairs, on several of the anterior segments, and long, spreading, pencil-like bushes of bushy black hairs (knobbed at the end) at each side of the head and tail. *Orgyia Gonostigma*, the second species (the Rare Vapourer), has the brown ground colour of its wings beautifully varied by several white and orange markings and spottings, especially near the tips, as shown in the representation (No. 8), and some of the lighter portions of the fore-wings are suffused with a soft, pinkish tone. The female, though closely resembling that of the preceding species in possessing only the mere rudiments of wings, and in the same dull, cold, gray colour, is very much larger, though the male is as nearly as possible of the same size as *O. Antiqua*. The Caterpillar is distinguished from that of the common species by a distinct orange stripe on each side of the back, and by the browner colour of the tussocks. It is found on Bramble, Hazel, and Oak, but is very rare, though specimens are taken in the south of England nearly every season. Doncaster, Combe Wood, and Epping, are also mentioned as localities where it has been found.

The following is the arrangement of the two Sub-Families and the sixteen Genera contained in the family of the *Arctiidæ*.

FAMILY IV.—ARCTIIDÆ.

SUB-FAMILY 1.—LIPARIDI, containing nine genera :—

1. Lymantria . . The Black Arches.	6. Lælia . . . The Whittlesea Ermine.
2. Hypogymna . The Gipsy.	7. Leucoma . . . The Black V-Moth.
3. Dasychira . . The Dark Tussock.	8. Stilpnotia . . . The White Satin Moth.
4. Demas . . The Nut-tree Tussock.	9. Euproctes . . . The Brown-tail Moth.
5. Orgyia . . . The Vapourers.	

SUB-FAMILY 2.—The CHELONIDI, containing seven genera :—

1. Hypercompa . . The Scarlet Tiger.	5. Phragmatobia . . The Ruby Tiger.
2. Deacrisia . . . The Clouded Buff.	6. Spilosoma . . The Large Ermine.
3. Arctia . . . The Garden Tiger, &c.	7. Cycnia . . . The Spotted Muslin.
4. Parasemia . . . The Wood Tiger.	


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PLATE XI.

No. 1.—The Whittlesea Ermine (*Lælia Cœnosa*).
No. 2.—The Caterpillar of the Whittlesea Ermine.
No. 3.—The Black V-Moth (*Leucoma Vau-nigrum*).
No. 4.—The White Satin Moth (*Stilpnotia Salicis*).
No. 5.—The Caterpillar of the White Satin Moth.
No. 6.—The Brown-tail Moth (*Euproctis Chysorrhœa*).
No. 7.—The Female of the Brown-tail Moth.
No. 8.—The Caterpillar of the Brown-tail Moth.
No. 9.—The Gold-tail Moth (*Euproctis Auriflua*). The Male.
No. 10.—The Caterpillar of the Gold-tail Moth.

THE genus *Lælia* is a comparatively recent addition to the catalogue of British Lepidoptera ; the only known species having been captured for the first time about 1825, in which year it was engraved in Curtis's "British Entomology" as *Arctia Cœnosa*. It received its present name from Mr. Stephens in 1828, when he described it from a specimen taken at Whittlesea Mere, the only locality in which it has yet been found.

Lælia Cœnosa (the Whittlesea Ermine, No. 1) is remarkable for the size of the antennæ of the males, which are deeply bipectinated. In the females, the pectinations of the antennæ are scarcely visible, and the wings are paler coloured and more transparent than those of the other sex. The Caterpillars (No. 2) have four tussocks of hair similar to those of the *Vapourers*. They are found in July on the *Butomus Umbellatus*, which grows in great abundance in Whittlesea Mere, and the perfect Moth appears in August.

The genus *Leucoma*, the name of which is formed of a Greek word meaning *white*, contains but one British species. It is distinguished by the snowy whiteness of the wings, and also by the character of the Caterpillars, which have the tussocks of the preceding genera, but not the long pencil-like tufts of separate hairs.

Leucoma Vau-nigrum (the Black V-Moth No. 3) does not differ in appearance in the two sexes ; both having the slightly marked black V near the centre of the anterior wings ; the female, however, is generally larger than the male, and the light-brown antennæ are not above one-third as deeply pectinated as in the males. The Caterpillar is black on the back, the sides being of a pale brownish colour, and it has eight tussocks of silky hair, the three middle ones of a pale yellow tone, and the others white. It feeds on Willows in June and July, and the Moth is found in August. The Chrysalis is green, with a dark spot on the thorax. As a British species it is extremely rare, but is said to be taken occasionally at Darenth Wood, Kent. On the Continent it is abundant in many localities.

The genus *Stilpnotia*, in the perfect insect, closely resembles *Leucoma*, but the antennæ of *Leucoma* are brown, while the genus *Stilpnotia* is distinguished by the blackness of the antennæ ; and in the caterpillar stage it is at once distinguished by the entire absence of the tussocks.

Stilpnotia Salicis (the White Satin Moth, No. 4) the only native species. It is very common, and found abundantly everywhere. The female is generally larger than the male, and the antennæ are pectinated, but much more slightly than in the male. The Caterpillar (No. 5) feeds on Willows and Poplars in June, and the Moth appears in July.

The genus *Euproctis* has shorter and rounder wings than the preceding species, the legs are much more downy, and the abdomen is terminated, in both sexes, with a remarkable tuft of a woolly substance, either yellow or brown, much more conspicuous in the females, who use it to envelope the eggs after they are deposited. The Caterpillars are furnished with two long, pencil-like tufts of black hair at each extremity, but are devoid of the tussocks of other neighbouring genera.

Euproctis Chrysorrhœa (the Brown-tail Moth, No. 6) has the wings entirely white on the upper side, but on the under side the anterior wings are shaded with brown. The Caterpillar (No. 8), is prettily varied in colour ; the red, white, and orange markings being remarkably bright. It is also distinguished by the whisker-like tufts of hairs on each side of the head, and at the tail ; the other segments having less conspicuous tufts of slenderer and shorter hairs. It feeds on Hawthorn, Sloe, and many other trees, in June, and the Moth appears in July. It is a very common species. The female Moth (No. 7) is much larger than the male.

Euproctis Auriflua (the Gold-tail Moth, No. 8), is still more common, and is seen fluttering about hedgerows on most evenings towards the end of June or beginning of July, disappearing towards the end of the month. It may be at once distinguished from the former species by the colour of the tuft at the extremity of the abdomen, which is of a bright golden orange, while in the former species it is of a deep full brown. The anterior wings of this species are also marked with a faint brown double spot near the inner angle of the upper wings, which is seldom found in the brown-tail species. Its favourite food appears to be the White-thorn, but it is a very general feeder, and sometimes so abundant as to become a real garden nuisance. In 1782, as Mr. Westwood informs us, it appeared in such swarms that the Londoners became seriously alarmed, as at a true Egyptian plague, prayers being offered up in the churches against the insect invasion, while the overseers and churchwardens of the suburban villages offered rewards per bushel for their destruction, and attended in person to see them burnt in large fires kindled for the purpose. The alarm is said to have been allayed by the sensible little treatise on the subject, by Mr. Curtis, which appeared most opportunely. The male Moth is much smaller than the female, as in the preceding species.


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PLATE XII.

No. 1.—The Scarlet-Tiger (*Hypercompa Dominula*).
No. 2.—The Caterpillar of the Scarlet-Tiger.
No. 3.—The Clouded Buff (*Diacrisia Russula*).
No. 4.—The Female of the Clouded Buff.
No. 5.—The Caterpillar of the Clouded Buff.
No. 6.—The Garden-Tiger, or Great Tiger Moth (*Arctia Caja*).
No. 7.—The Caterpillar of the Garden-Tiger.
No. 8.—The Wood-Tiger (*Parasemia Plantaginis*).
No. 9.—The Caterpillar of the Wood-Tiger.
No. 10.—The Ruby-Tiger (*Phragmatobia Fuliginosa*).
No. 11.—The Caterpillar of the Ruby-Tiger.
No. 12.—The Spotted Buff (*Spilosoma Lubricepeda*).
No. 13.—The Caterpillar of the Spotted Buff.
No. 14.—The Spotted Muslin (*Cycnia Mendica*).
No. 15.—The Female of the Spotted Muslin.
No. 16.—The Caterpillar of the Spotted Muslin.

With the genus *Hypercompa*, according to the arrangement I am following, commences the second sub-family of *Arctiidæ*, termed the *Chelonidi*, from the typical genus of the group, formerly termed *Chelonia*, but now *Arctia*. It contains the following seven genera, the whole of the species of which are more or less conspicuous and handsome.

The genus *Hypercompa* has the antennæ in both sexes slightly ciliated, the body is long and somewhat slender, and the wings are deflexed, and very densely covered with scales, which gives them an exceedingly soft and velvety appearance.

Hypercompa Dominula (the Scarlet-Tiger, No. 1) is one of our handsomest Moths. The markings of the hind-wings are subject to extreme variation, the scarlet ground being sometimes nearly or entirely merged in the black, in very dark specimens. The Caterpillars (No. 2), which are only slightly hairy, feed on Willow, Ash, and some herbaceous plants, and are found early in the season, the perfect Moth appearing in June. It is a rather rare species, but occurs, though sparingly, in many parts of the country.

The genus *Diacrisia*, the *Euthemonia* of Stephens, is distinguished from others of this group by having the anterior wings nearly of one uniform colour. The antennæ of the males are slightly bipectinated, and their general colour is paler and yellower than that of the females.

Diacrisia Russula (the Clouded Buff, No. 3) is by no means common, but is found occasionally on heaths, and in open woods in many parts of the country. The Caterpillar (No. 5) feeds on Plantain, Scabious, and other herbaceous plants in May, and the Moth appears at the end of June.

The genus *Arctia*, which gives its name to the family of *Arctiidæ*, contains two British species, both remarkably handsome, and the exotic species are most of them very beautiful: it contains, in short, some of the most beautiful of the night-flying *Lepidoptera*. The antennæ of the males are but slightly bipectinated, and those of the females only slightly toothed. The females are of equal size, or larger than the males. Their Caterpillars are covered with fur-like hairs of various shades of brown and black, from which they have received their popular name of "Woolly-bears." There are about thirty European kinds, though only two British.

Arctia Caja (No. 6) is the well known and common Garden Tiger Moth, whose conspicuous markings seldom fail to attract the attention even of careless observers. The maculations both of the upper and lower wings are subject to extreme variations in this species, the upper being occasionally, though rarely, either all cream-colour, or entirely of the deep rich brown of the markings, while the bright scarlet of the hind-wings is sometimes nearly absorbed in the black portions, or, these markings becoming nearly obsolete, leave the scarlet predominant. The Caterpillar (No. 7) is found early in June, and is a general feeder; the Moth appears in July. Late broods of the Caterpillar, however, do not change the same season, but survive the winter in a dormant state, completing their growth in the early spring.

Arctia Villica (the Cream-spot Tiger) is somewhat smaller than the preceding, and the anterior wings differ, in having the rich brown rather as the ground colour than the markings, leaving the cream-colour in detached blotches, from which it has received its popular name. The body and hind-wings, instead of being scarlet, like those of the Garden-Tiger, are of a rich orange buff, sparingly marked with delicate touches of black. The Caterpillar, which is black, and not nearly so hairy as that of *A. Caja*, feeds on Ragwort, Chickweed, and other early growing plants. It is found in spring, the Moth appearing in June. It is by no means so common as *A. Caja*, though an abundant species.

The genus *Parasemia*, the *Nemeophila* of Stephens, is of slenderer form than of most of the true *Chelonidi*, but the markings of the species it contains are of the same conspicuous character as those of the more robust kinds. These markings vary considerably, both in colour and distribution. The antennæ are slightly pectinated in the males, the females being generally larger than the opposite sex. There is only one British species.

Parasemia Plantaginis (the Wood-Tiger, No. 8) is a very pretty Moth, and is far from rare. The Caterpillar (No. 9) is dusky black, with several of the central segments of a rich orange-brown, both colours having a row of spots of a deeper tone, and the whole body being thickly clothed with long hairs. It feeds on Plantain in autumn and spring, and the Moth appears in June.

The genus *Phragmatobia* has the wings semi-transparent. The antennæ are short, and nearly simple in both sexes, which scarcely differ either in size or colour.

Phragmatobia Fuliginosa (the Ruby-Tiger, No. 10) is pretty generally distributed, and by no means uncommon. The Caterpillar (No. 11) feeds on various herbaceous plants in June, and the Moth appears in July. There is a slate-coloured variety, which some have considered a distinct species.

The genus *Spilosoma* is distinguished by the sharp delicate spottings of the wings and body, from which both the generic, and the different popular names, as White Ermine, Buff Ermine, etc., are derived. The ground colour of the wings is generally white or buff, and the body orange. The antennæ are bipectinated in the males. The Caterpillars are hairy, like those of the genus *Arctia*, but more slender. There are three British species.

Spilosoma Menthastri (the Large Ermine) is a very common insect. The anterior wings are buff, with a number of small black spots; the hind-wings being white, only varied by three or four delicate black specks. The body is orange, marked with black at the joints of the abdomen. The Caterpillar is larger than that of any other of the species. It is black, clothed, but not densely, with brown hairs, between which an orange stripe is perceptible down the centre of the back. It feeds on many low plants in August, and the Moth appears in the following May. It is very common everywhere.

Spylosoma Papyratia (the Water Ermine) is a very rare species, and differs from the others in having its delicately white wings almost entirely free from the black spottings of the other kinds. A few slight touches of black are found, however, in some specimens, particularly a row of dots near the edge of the anterior wings. The body is orange, marked with black, like the last species. The Caterpillar is dark brown, with long hairs; the spiracles being yellow. It feeds on various water plants, and the Moth appears in June in marshy districts, but is extremely rare.

Spilosoma Lubricepeda (the Buff Ermine, No. 12) is the commonest of the genus, and the one I have selected for its illustration. It varies very considerably in the markings, the ordinary black spots becoming occasionally patches or stripes. These variations are, however, of rather rare occurrence. The Caterpillar (No. 13) feeds on various plants, and is found in the autumn, the perfect Moth appearing in the following June.

The genus *Cycnia* is distinguished from *Spilosoma* by the decided semi-transparency of the wings, and by the difference which exists in the colour of the males and females. The antennæ of the males are bipectinated, those of the females simple. The Caterpillars closely resemble in character those of the genus *Spilosoma*, but are more slender.

Cycnia Mendica (the Spotted Muslin, No. 14) is a pretty little Moth, the general appearance of which is well expressed by its popular name, the semi-transparent or muslin-like effect being as apparent both in the brown male and in the delicately white female. This is the only British species. The Caterpillar (No. 15) feeds upon various aquatic plants in autumn, and the perfect insect appears in districts where water abounds in the following May. It is, however, a rare species, though found in many parts of the country.


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PLATE XIII.

No. 1.—The Large Chimney-sweep (*Sterrhopterix Nigricans*).

No. 2.—The Female of the Large Chimney-sweep.

No. 3.—The Brown Muslin (*Psyche Fusca*).

No. 4.—The Female of the Brown Muslin.

No. 4½.—The Caterpillar of the Brown Muslin, in its case.

No. 5.—The Shining Chimney-sweep (*Fumea Nitidella*).

No. 6.—The Caterpillar of the Shining Chimney-sweep, in its case.

No. 7.—The Muslin (*Nudaria Mundana*).

No. 8.—The Caterpillar of the Muslin.

No. 9.—The Round-winged Muslin (*Nudaria Senex*).

No. 10.—The Triangle (*Heterogenea Asellus*).

No. 11.—The Caterpillar of the Triangle.

No. 12.—The Festoon (*Limacodes Testudo*).

No. 13.—The Female of the Festoon.

No. 14.—The Cinnabar Moth (*Callimorpha Jacobææ*).

No. 15.—The Caterpillar of the Cinnabar Moth.

No. 16.—The Red Arches (*Miltochrista Miniata*).

No. 17.—The Feathered Footman (*Eulepia Grammica*).

No. 18.—The Caterpillar of the Feathered Footman.

No. 19.—The Crimson-speckled Footman (*Deiopeia Pulchella*).

No. 20.—The Caterpillar of the Crimson-speckled Footman.

No. 21.—The Orange Footman (*Lithosia Aureola*).

No. 22.—The Caterpillar of the Orange Footman.

No. 23.—The Large Footman (*Œnistis Quadra*). (Misnumbered 4½.)

No. 23½.—The Female of the Large Footman.

No. 24.—The Caterpillar of the Large Footman.

No. 25.—The Red-necked Footman (*Atolmis Rubricollis*).

No. 26.—The Caterpillar of the Red-necked Footman. (Misnumbered 23.)

No. 27.—The Four-spot Footman (*Cybosia Mesomella*).

No. 28.—The Dew Moth (*Endrosa Irrorella*).

No. 29.—The Caterpillar of the Dew Moth.

The sub-family *Psychidi*, embracing the genera *Sterrhopterix*, *Psyche*, *Fumea*, and *Nudaria*, contains a set of insects of the most singular and anomalous character. This group is especially marked by the entirely wingless females, which in some cases are without either legs or antennæ, and are, in fact, perfectly vermiform. The curious shell-like protection formed by the caterpillars is also very remarkable, resembling that of the Caddis Worm family, which, combined with the extraordinary facts recently observed concerning the manner of reproduction of this class of Moths, renders them of the greatest interest to naturalists. Their position in the modern system of classification has been several times changed, some recent classifiers having placed them along with the *Tineæ*. In former systems they were placed in a section of *Bombycidæ*, while the closely allied genus *Sterrhopterix*, from the character of the female being till recently unknown, was not placed along with them. I have followed the system adopted in the national collection, in which the *Psychidæ*, along with *Sterrhopterix*, appear to be very properly made a distinct sub-family.

The genus *Sterrhopterix* contains two British species, the most robust insects of this group. In *S. Nigricans*, (the Large Chimney-sweep, No. 1), the wings of the male are of a rich soft brown, and rather hairy and semi-transparent; the body is robust and woolly, and the antennæ are pectinated. The female (No. 2) is entirely wingless, much resembling a larva before its metamorphosis, but of a more maggot-like conformation. The abdomen is of a dull orange colour, and the thorax and head nearly black. The larva, with its house of husks and small sticks, is nearly an inch and a-half long, and sometimes of considerable diameter. Its general appearance, however, is much like the smaller larva of *Psyche Fusca* (No. 4½). The other English species, *S. Opacella*, is smaller, and the wings are much paler and more transparent.

The genus *Psyche*, the peculiar characteristics of which were known before those of any other of its congeners, and has therefore given its name to the whole group, contains but one species.

Psyche Fusca (the Brown-Muslin Moth, No. 3) is a very elegant little insect. The wings of the male are of a delicate bluish black, and semi-transparent. The female (No. 4) is entirely wingless. The Caterpillar makes a case, which is represented at No. 4½. The Chrysalis resembles, in its general form, that of the house-fly tribe, being nearly oval, without any mark of wing-case, but ribbed with several joint-like articulations from end to end.

The genus *Fumea* differs from *Psyche* in its broader and more hairy wings, and the antennæ of the males are very strongly pectinated. There are three British species.

Fumea Nitidella (the Shining Chimney-sweep, No. 5) has the wings of the male of a light shining brown, the hind wings being generally of a lighter tone, though sometimes darker. The Caterpillar forms a case much like that of *P. Fusca*, and is represented at No. 6.

F. Radiella (the Chimney-sweeper's Boy) is the smallest of the genus, not much more than half the size of the preceding species. The wings of the male are semi-transparent, black, and the antennæ are only slightly pectinated.

F. Reticella (the Netted Chimney-sweep) is nearly as small as the last-named species, from which it is distinguished by a beautiful minute network of soft brown lines extending all over the wings.

The genus *Nudaria* is grouped with the *Psychidæ*, from the similarity in form and character of the perfect insect, which is, however, winged in both sexes, and the Caterpillars do not form portable cases. In fact, all the species of *Nudaria* seem, on the whole, more closely allied to the *Lithosiidæ*. *Nudaria Mundana* (the Muslin) is represented at No. 7, and the Caterpillar, which is common and feeds on lichens, at No. 8.

N. Senex (the Round-winged Muslin, No. 9) is distinguished by the greater whiteness and delicacy of the wings, and by the minute black specks with which they are marked.

The sub-family *Limacodidi* contains two genera, in many respects allied to those of *Psychidi*, but still more remarkable in respect to the footless Caterpillars, of singular shape, which distinguish both the genera of which it is composed.

The genus *Heterogenea*, so named in reference to the unusual form of the Caterpillars, contains only one species, *H. Asellus*, which is remarkable for the triangular form of the wings, from which it has received its popular name, the Triangle, but which are scarcely sufficiently marked in the illustration (No. 10). The Caterpillar (No. 11) feeds upon poplar, and is very rare; it has, however, been found in the New Forest.

The genus *Limacodes* contains only one species, *Testudo* (No. 12). This genus was formerly considered a species of *Heterogenea*, from which it was separated on account of the different form of the wings. Our great English entomologist, Haworth, named this genus *Apoda*, that is, footless, in allusion to the peculiar structure of the Caterpillar, which resembles that of *H. Asellus*, but is somewhat larger. The wings of the female (No. 13) are more faintly marked than those of the male. The Caterpillar feeds on oak, in September, and is found sometimes in the Kentish woods. There are several North American species of this curious insect.

The second sub-division of Moths, *Lepidoptera Nocturna*, commences with the family of *Lithosidæ*, containing nine genera, which, with two exceptions, appear to group together very homogeneously. The Moths of this small family have the body narrow, the antennæ generally slender, and simple in both sexes; but occasionally slightly pectinated in the males. The wings are narrow and elongated, of delicate texture, and their flight is short and feeble.

The genus *Callimorpha* is one of those which, from the breadth and triangular form of the wings, seems hardly to belong to the family in which it is placed, though it has many affinities with it. It contains only one British species, *C. Jacobææ* (the Cinnabar Moth), represented at No. 14. It is a very handsome insect, and has the under side of the wings exactly like the upper, both in colour and in the distribution of the markings, which is very unusual either in Moths or Butterflies. The Caterpillar (No. 15) is very common, and is found, in the summer months, feeding in preference on the common groundsel.

The genus *Miltochrista* is distinguished from the preceding by the smaller size of the insects of which it is composed, by the more hairy though more slender body, and by the thicker clothing of hair of the Caterpillars. *Miltochrista Miniata*, the Red Arches, is figured at No. 16. The Caterpillar feeds on lichens and various trees, the perfect insect appearing in June. It is considered rare, though found in various parts of the country.

The genus *Eulepia* is distinguished by the pectinated antennæ of the males, and by the streaky markings of

the anterior wings and generally deeper colour of the hinder ones, the Caterpillars being of similar character to those of other *Lithosidæ*. It contains two British species.

Eulepia Grammica (the Feathered Footman, No. 17) is one of the rarest of the *Lithosidæ*, the Caterpillar (No. 18) feeds on various plants and shrubs in May, and the perfect insect appears in July.

Eulepia Cribrum is equally rare, but has been found on the heathy lands of Hampshire, and other localities. It is distinguished from *Grammica* by having the dark stripes of the anterior wings broken up into detached marks, and the hind wings are of uniform dark brown with lighter fringe.

The genus *Deiopeia*, one of the most distinct from the other *Lithosidæ*, is distinguished by a peculiarity of marking not found in any other genus. It contains but one native species, *Deiopeia Pulchella* (No. 19), which is one of the most elegant of British Moths. The Caterpillar (No. 20) appears to feed in preference on the field forget-me-not (*Myosotis Arvensis*), the perfect insect appearing, in this country, in September and October. It is very rare.

The genus *Lithosia*, which forms the type of the family to which it belongs, contains eight species, all exhibiting the same general character as *Lithosia Aureola*, the one selected for illustration.

Lithosia Aureola (the Orange Footman, No. 21) is rare, but occurs in many places in the south of England, especially where exotic trees of the pine family have been planted, on which the Caterpillars feed in May and June, and the perfect insect appears in July. It is a very common insect on the Continent.

L. Helvola (the Buff Footman) is somewhat smaller than *Aureola*, the front wings dove colour, the hind wings pale buff.

L. Flava (the Straw-coloured Footman) is about the size of the preceding; all four wings being of a pale buff or straw-colour.

L. Complana (the Scarce Footman) is of similar size, but the anterior wings are grey, with a stripe of pale yellow along the front, the hind wings being straw-colour.

L. Lurideola (the Common Footman) is much like the preceding, which is, possibly, a rare variety. It is often mistaken for it by young collectors.

L. Griseola (the Dun Footman) is rather larger than any of the preceding. The front wings are pale grey, with a very narrow line of straw-colour in front; the hind wings buff.

L. Luteola (the Small Footman) has all four wings pale yellow, like *L. Flava*, but is much smaller.

L. Muscerda (the Spotted Footman) has both front and hind wings of a pale soft grey, the front wings being distinguished by a line of pale yellow along the front, and several small black specks, the hind wings having a broad but interrupted central band of pale buff. It is a very distinct species.

The genus *Œnistis* is of true *Lithosian* character, but the insects it comprises are both larger and handsomer, and differ materially in the colouring of the two sexes, as shown in figures of *Œnistis Quadra* (the Large Footman), the only native species, 23 (misnumbered $4\frac{1}{2}$) and $23\frac{1}{2}$. The Caterpillar of this handsome insect (No. 24) feeds on oak, birch, etc., in June, and the Moth appears in July. It is a common species.

The genus *Atolmis* differs in appearance from the other *Lithosidæ*, in the dark colour of the solitary species on which it is founded, and some minute anatomical distinctions. *A. Rubricollis* (the Red-necked Footman), so named from the small red mark close to the head, is a very pretty insect. The Caterpillar, No. 26 (misnumbered 23), feeds on lichens and various trees in spring, and the Moth appears from May to July. It is far from common.

The genus *Cybosia* is distinguished by more opaque and more triangular-shaped wings than the true *Lithosidæ*. The only species, *C. Mesomella* (the Four-spotted Footman, No. 27), is not rare in favourable localities. The Caterpillar, which is short and thick, of greyish colour, with a reddish head, feeds on various plants. The Moth appears in June and July.

The genus *Endrosa* has the anterior wings of the same form as those of the preceding genus, but they are semi-transparent. The only British species admitted in the Museum Catalogue is *E. Irrorella* (the Dew Moth, No. 28). There is, however, a very singular variety in which the dark spots on the front wings are conspicuously united, forming the letters I V I. The Caterpillar (No. 29) feeds upon lichens, and the Moth, which is rare, except in the south of England, appears in June and July. The species, once distinguished as *Roscida*, is not now admitted to the list of Native Moths.

The following is a summary of the system, up to the beginning of the *Lithosidæ*, upon which the British *Lepidoptera* are arranged in the collection of the British Museum :—

Class.—INSECTA HAUSTELLATA.

Order.—LEPIDOPTERA.

Separated into—

1. RHOPOLOCERA (Butterflies), not treated of in this work.
2. HETEROCERA (Moths).

HETEROCERA.

Division I. Lepidoptera Crepuscularia.

Family 1. Zygænidæ.

CONTAINING—

Genus 1. Procris. Genus 2. Anthrocera.

Family 2. Sphingidæ.

Genus 1. Smerinthus. Genus 4. Deilephila.
„ 2. Acherontia. „ 5. Chærocampa.
„ 3. Sphinx. „ 6. Daphnis.

Family 3. Sesiidæ.

Genus 1. Macroglossa. Genus 2. Sesia.

Family 4. Ægeriidæ.

Genus 1. Sphecia. Genus 2. Trochilium.

Division II. Lepidoptera Nocturna.

Sub-division I. Lepidoptera Pomeridiana.

Family 1. Hepialidæ.

CONTAINING—

Genus 1. Hepialus. Genus 3. Phragmatæcia.
„ 2. Zeuzera. „ 4. Cossus.

Family 2. Notodontidæ.

Sub-family 1. Pygeridi.*

Genus 1. Phalera. Genus 2. Clostera.

Sub-family 2. Dicranuridi.

Genus 1. Cerura. Genus 2. Stauropus.

Sub-family 3. Notodontidi.

Genus 1. Notodonta. Genus 6. Drymonia.
„ 2. Pheosia. „ 7. Gluphisia.
„ 3. Lophopterix. „ 8. Diloba.
„ 4. Pterostoma. „ 9. Petasia.
„ 5. Ptilophora. „ 10. Peridea.

Family 3. Bombycidæ.

Sub-family 1. Attacidi.

Genus 1. Saturnia

Sub-family 2. Bombycidi.

Genus 1. Lasiocampa. Genus 3. Pœcilocampa.
„ 2. Eriogaster. „ 4. Trichiura.
Genus 5. Clisiocampa.

Sub-family 3. Lasiocampidi.

Genus 1. Odonestis. Genus 2. Dendrolimus.
Genus 3. Gastropacha.

Family 4. Arctiidæ.

Sub-family 1. Liparidi.

Genus 1. Lymantria. Genus 5. Orgyia.
„ 2. Hypogymna. „ 6. Lælia.
„ 3. Dasychira. „ 7. Leucoma.
„ 4. Demas. „ 8. Stilpnotia.
Genus 9. Euproctis.

Sub-family 2. Chelonidi.

Genus 1. Hypercompa. Genus 4. Parasemia.
„ 2. Diacrisia. „ 5. Phragmatobia.
„ 3. Arctia. „ 6. Spilosoma.
Genus 7. Cycnia.

Sub-family 3. Psychidi.

Genus 1. Sterrhopterix. Genus 3. Fumea.
„ 2. Psyche. „ 4. Nudaria.

* It will be observed that the sub-families are distinguished from the families by the termination *i*.


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PLATE XIV.

No. 1.—The Large Yellow Underwing (*Triphæna Pronuba*).

No. 2.—The Caterpillar of the Large Yellow Underwing.

No. 3.—The Broad-bordered Yellow Underwing (*Triphæna Fimbria*).

No. 4.—The Caterpillar of the Broad-bordered Yellow Underwing.

No. 5.—The Straw Underwing (*Thalpophila Texta*).

No. 6.—The Square-spot Rustic (*Segetia Xantographa*).

No. 7.—The Brown Feathered Rustic (*Rusina Ferrugineu*).

No. 8.—The Six-striped Rustic (*Lytæa Umbrosa*).

No. 9.—The Antler (*Cerapteryx Graminis*).

No. 10.—The Black Rustic (*Charæs Æthiops*).

With this Plate commences the illustration of the extensive family of the *Noctuidæ*, which, from its extent and consistent general characteristics, might be taken as the typical group of British Moths. The *Noctuidæ* are generally robust; the antennæ most frequently simple; the thorax and abdomen are somewhat robust and often crested; the wings of moderate size and strongly nerved. The Caterpillars are generally smooth, and have sixteen feet, though, in some cases, the first, and in others the first and second, pair of ventral feet are wanting. As their name imports, they are almost all night-flyers—that is to say, true Moths; but, nevertheless, some of them fly at dawn and twilight, and some even at mid-day. There are about 400 species of *Noctuidæ*, divided into about eighty genera, the number of which, however, are being continually varied by new methods of classification. The main features of the system upon which the family is founded remain, however, undisturbed, and are likely to do so, as the group still corresponds pretty nearly with the section originally established by Linnæus under the name of *Phalaena Noctua*.

The first sub-family of *Noctuidæ* is termed *Noctuelidi*, containing fourteen genera.

The genus *Triphæna* contains the handsome Moths known as Yellow Underwings, which have the antennæ simple in both sexes, the abdomen broad and flat, and terminating with a brush-like tuft in both sexes; the fore wings are long and narrow, and the hind wings invariably yellow, with strongly marked black band. The transformation of the larva takes place in the earth, sometimes at a considerable depth, and the perfect insects in all the species are strong and rapid flyers.

Triphæna Pronuba (the Large Yellow Underwing, No. 1) is one of the most common, and, at the same time, one of the handsomest of the genus. Some individuals of this species vary considerably in the tone and markings of the wings, and such have been described as distinct species by several authors. The one represented is a medium specimen. The Caterpillar feeds on the roots of various plants, and the perfect insect appears in June and July, and is common everywhere.

Triphæna Fimbria (the Broad-bordered Yellow Underwing, No. 3) is the most beautiful of the genus; the conspicuously broad, purplish border of the hind wings, and the soft rich buff of the front wings, giving it quite a distinct character from its congeners. The large and handsome Caterpillar is found in Autumn and spring, feeding on the primrose, violet, potatoe, and other plants. It is a rare species, though occasionally found in many parts of the country.

The other species are *T. Subsequa* (the Lunar Yellow Underwing), *T. Orbona* (the Lesser Yellow Underwing), *T. Interjecta* (the Least Yellow Underwing), and *T. Janthina* (the Lesser Broad Border). The commonest of these is *T. Orbona*, and the rarest *T. Subsequa*.

The genus *Thalpophila* is very closely allied to *Triphœna*, both in its preparatory and perfect states, on which account the insects now belonging to it were separated from the genus *Polia*, where they had been located by Ochsenheimer, and placed next to *Triphœna*.

Thalpophila texta (the Straw Underwing, No. 5) is the only British species. The Caterpillar is pale grey, darker on the back ; it feeds on the goat's-beard and other plants in spring and autumn, and the Moth, which is very rare, appears in June and July.

The genus *Segetia*, like the preceding, has also been brought nearer to *Triphœna* by recent arrangement. The antennæ of the males are strongly ciliated.

Segetia Xantographa (the Square-spot Rustic, No. 6) is a common Moth, and appears in August. The Caterpillar, is pale, dirty yellow, with a lighter line on each side, and feeds throughout the winter. There is only one British species.

The genus *Rusina* is remarkable among the *Noctuidæ* for its deeply pectinated and *Bombyx*-like antennæ.

Rusina ferruginea (the Feathered Rustic, No. 7) has received its popular name from the full feathering antennæ so unusual among the allied genera. The Caterpillar is dusky brown with pale stripes. The perfect insect has been taken in July near Darenth and at Wimbledon, but is rare, and is the only British species.

The genus *Lytæa* has the antennæ somewhat robust, and distinctly ciliated in the males, the two species differing, however, considerably in this respect.

Lytæa Umbrosa (No. 8) is known as the Six-striped Rustic, from the number of rather distinct bands by which the fore wings are traversed. The Caterpillar is greyish white, with a dusky stripe, and is to be sought in the spring and early summer, the perfect insect appearing in July and August. It is rather rare.

The genus *Cerapteryx* is distinguished from the preceding genera by the smaller size of the Moths, the light coloured stripes which follow the direction of the veins on the anterior wings, and several anatomical distinctions too technical for detail in a popular work.

Cerapteryx Graminis (the Antler, No. 9) occasionally appears in great numbers, especially in mountainous districts, the larvæ committing great ravages among the roots of the grass, by which whole meadows are sometimes destroyed. The Moth appears in July and August.


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PLATE XV.

No. 1.—The Common Dart (*Agrotis Segetum*).
No. 2.—The Caterpillar of the Common Dart.
No. 3.—The Coast Dart (*Agrotis Cursoria*).
No. 4.—The Heart and Dart (*Agrotis Exclamationis*).
No. 5.—The Caterpillar of the Heart and Dart.
No. 6.—The Rosy Marsh Moth (*Cœnophila Subrosea*).
No. 7.—The Welsh Rustie (*Spælotis Ashworthii*).
No. 8.—The Dotted Rustie (*Spælotis Pyrophila*).
No. 9.—The Purple Clay (*Graphiphora Brunnea*).
No. 10.—The Ingrailed Clay (*Graphiphora Festiva*).
No. 11.—The Caterpillar of the Ingrailed Clay.
No. 12.—The Double-square Spot (*Graphiphora Triangulum*).

The genus *Agrotis* contains, even in its restricted form, a considerable number of distinct species, each of which is subject to great variations in colour and marking, rendering the group somewhat heterogeneous in aspect, though possessing certain general characteristics which are amply sufficient to establish those decided affinities of structure which warrant the present arrangement of the genus. The males of this group have generally slightly pectinated or ciliated antennæ, which are longer than in some neighbouring groups. The antennæ of the females are shorter, and generally simple. The front wings are rather long, and have very distinct stigmata and other marks; the hind wings being pale, without mark, and the fringes paler. The body is somewhat robust, the abdomen rather depressed, and not crested. The Caterpillars are smooth, and of a livid or brown colour, varied with dull markings. They feed either on the roots or the lowest foliage of herbaceous plants, in the night, concealing themselves by day. They undergo their transformation in the earth, the Chrysalis being generally enveloped in a very slightly formed cocoon. I have selected the three following species as examples of the most dissimilar, but, at the same time, the most characteristic of the species :—

Agrotis Segetum (the Common Dart, No. 1) is less distinctly marked in the female than the male. The Caterpillar (No. 2) feeds on the roots of various grasses. It is common everywhere.

Agrotis Exclamationis (the Heart and Dart, No. 4) has received its popular name from the distinct forms of a heart, and the blade of a dagger, which may be traced upon the anterior wings; the last-named mark is present in most species of this group, thence called Darts. The systematic specific name is likewise, as it would seem, derived from the same dart-shaped mark, which also resembles a point of exclamation. This mark, too, is very constant in all specimens, while the heart-shaped stigma is often very faint in this species, and sometimes scarcely traceable. The Caterpillar (No. 5) is found in the month of July, under stones, or at the roots of grass, though it is said to feed on groundsel.

Agrotis Cursoria (the Coast Dart, No. 3) is remarkable for the distinct ochreous tone of the front wings, but this colouring is very various in different specimens. It is one of the rarest species. The Caterpillar feeds on several kinds of spurge that grow near the sea, and is to be sought in the months of June or July.

The following species of *Agrotis* are enumerated in the catalogue of the collection in the British Museum, but in the present work, as only professing to deal with genera, they cannot be all described in detail. *A. Corticea* (the Heart and Club); *A. Valligera* (the Archer's Dart); *A. Lunigera* (the Crescent Dart); *A. Suffusa* (the Dark Sword Grass); *A. Saucia* (the Pearly Underwing); *A. Subgothica** (the Gothic Dart); *A. Obelisca* (the Square-spot

* Not in many recent lists.

Dart); *A. Aquilina* (the Streaked Dart); *A. Tritici* (the White-line Dart); *A. Ripæ* (the Sand Dart); *A. Nigricans* (the Garden Dart); *A. Puta* (the Shuttle-shaped Dart); *A. Cineria* (the Light Feathered Rustic). The popular names of two of the above, the Dark Sword Grass and the Light Feathered Rustic, show that they were originally placed by popular collectors in different groups, and not reckoned among the true "Darts;" while species of two genera about to be described, *Oppigena* and *Spælotis*, have been placed by recent classifiers in the genus *Agrotis*.

The genus *Cænophila* contains only one British species, formerly a *Graphiphora*, which has been separated from that genus, as well as from *Agrotis*, on account of its strongly pectinated antennæ and the greater breadth of its hind wings. *Cænophila Rosea* (No. 6) is a very handsome insect, the anterior wings having, in very perfect specimens, a fine rosy flush. It is rare, but is found at Whittleseamere, and no doubt in other similar localities.

*Spælotis** is another genus recently formed by Dr. Boisduval, to include certain insects formerly classed with the *Graphiphoræ*, but which have been found to exhibit sufficient distinctive characters to warrant their separation.

Spælotis Ashworthii (the Welsh Rustic, No. 7), though still classed by some as an *Agrotis*, forms a good illustration of the general character of the new genus. The Caterpillar is green, with a paler dorsal line, and has a lateral whitish streak. It has been found in the neighbourhood of Llangollen, whence the popular name, the Welsh Rustic.

Spælotis Pyrophila (the Dotted Rustic) is exceedingly distinct in its colour and markings from the preceding species, as shown at No. 8. It is rare, but very widely dispersed, having been found in the north of Scotland.

The genus *Oppigena* was established by Dr. Boisduval in 1840, for certain species differing in some respects from *Agrotis*, *Spælotis*, or *Graphiphora*. A solitary British species has been assigned to it—*O. Fennica*—of which only one specimen has been taken in Derbyshire, and popularly named the Beautiful Dart. It is by some authors classed with *Agrotis*. The fore wings are of a deep violet grey, approaching black, the inner margin ochreous. The stigma marked with a very distinct light cream-coloured outline; the hind wings are pale brown.

The genus *Graphiphora* is principally distinguished from *Agrotis* by having the antennæ simple in both sexes, or only very slightly pectinated in the males. The fore wings are broad, and obtuse, and generally glossy. The markings, though similar to those in *Agrotis*, differ in having the two ordinary-shaped stigmata even more clearly developed than in *Agrotis*, while the dart-shaped one, so remarkable in that genus, is generally obsolete or nearly so in *Graphiphora*.

Graphiphora Brunnea (the Purple Clay, No. 9) is one of the best defined species, exhibiting all the characteristics of a true *Graphiphora*. The Caterpillar is brown, with yellowish markings along the back, and some conspicuous yellow spots and oblique streaks along the sub-dorsal line; the line above the legs is greyish buff. It is found on various low plants in spring, and is not very rare.

Graphiphora Festiva (the Ingrailed Clay, No. 10) forms a contrast to *Brunnea* in the paler, but yet distinct, markings of the fore wings, while the hind wings are more varied in tone by two deep borderings, very distinct in fine specimens. The Caterpillar (No 11) feeds on primrose in June, the Moth appearing in July and August. It is not rare, though somewhat local.

Graphiphora Triangulum (the Double-square Spot, No. 12) is another very distinct and well-marked species. The Caterpillar is reddish-brown, with paler stripes; it feeds on the deadly nightshade and other plants in April, and the Moth appears in July. It is not a rare species.

There are nine other species, among which the most remarkable are *G. Plecta* (the Flame Shoulder), with a broad stripe of pale yellow along the front of the wing; the rare *G. Depuncta*, with its fine brown markings on an ochreous ground; and *G. C.-Nigrum* (the Setaceus Hebrew Character), with its conspicuous ochreous patches in front of the stigmata, between which is the dark marking in the form of a Hebrew letter. The remaining species are *G. Baja*, *G. Dahlii*, *G. Rubi*, *G. Rhomboidea*, *G. Ditrapezium*, and *G. Glareosa*.

* *Spælotis Ashworthii* and *Oppigena Fennica* are, in Mr. Stainton's Manual, placed in the the genus *Agrotis*.


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PLATE XVI.

No. 1.—The Early Chestnut (*Cerastia Leucographa*).
No. 2 (misnumbered 22).—The True Lover's Knot (*Lycophotia Porphyrea*).
No. 3.—The Caterpillar of the True Lover's Knot.
No. 4.—The Hebrew Character (*Semiphora Gothica*).
No. 5.—The Pine Beauty (*Panolis Piniperda*).
No. 6.—The Caterpillar of the Pine Beauty.
No. 7.—The Red Chestnut (*Glæa Rubricosa*).
No. 8.—The Caterpillar of the Red Chestnut.
No. 9.—The Clouded Drab (*Orthosia Instabilis*).
No. 10.—A pale variety of the Clouded Drab.
No. 11.—The Common Quaker (*Orthosia Stabilis*).
No. 12.—The Blossom Underwing (*Orthosia Miniosa*).
No. 13.—The Caterpillar of the Blossom Underwing.

In the recent remodellings to which the difficult groups I am now describing have been subjected, more than one extensive genus has been reduced to a single species, so that, with the view of obtaining a good general idea of the relative affinities of nearly allied species, it will be found more instructive to look to the groupings of families and sub-families than to separate genera.

The genus *Cerastia* is at present confined to a single species, which, by some authors, is now placed in the genus, or sub-genus, *Tæniocampa;* but in the collection of the British Museum it is considered entirely distinct, and not even made one of the genera in the sub-family of *Orthosidi.*

Cerastia Leucographa (No. 1), the specific name of which is by no means descriptive, inasmuch as it has no conspicuous white mark, is known to collectors as the Early Chestnut, and appears in March and April. The Caterpillar, according to Treitschke, is green, sprinkled with brown and white dots, and has a rust-coloured stripe bordered with black running along the line of the spiracles. It has been found in Westmoreland, and also in the neighbourhood of Dorking and Marlow.

The genus *Lycophotia,* which, like the preceding one, contains only a single British species, has been moved to many different positions in the various modern systems of classification, but the situation in which it is placed, according to the system I am following, appears upon the whole the most natural. *Lycophotia Porphyrea* (the True Lover's Knot, No. 2) is a small but very elegantly marked insect, and is found on heaths about the end of July, being rather rare. The Caterpillar (No. 3) feeds upon various heath-growing plants, and is found in May or June.

The second sub-family of the *Noctuidæ* is termed *Orthosidi,* containing many of the genera of the *Orthosidæ* of other arrangements.

The first genus, *Semiphora,* is represented by a single species, which is found to differ from the *Graphiporæ* by the form of the anterior wings, and from the whole of the genus *Orthosia* by the remarkable distinctness of its maculations. It is from the last characteristic that the name *Semiphora,* from Greek words meaning "mark bearing," is derived. *Semiphora Gothica* (the Hebrew Character, No. 4) is not rare, and appears to be double brooded, as Boisduval gives both spring and autumn as the times of its appearance, but it is most usually found in April. The Caterpillar, according to Treitschke, is yellowish green, sprinkled with whitish specks or freckles, and having a dorsal and sub-dorsal stripe of dull yellow, and a white line at the side. It feeds on the Oak, and also on various herbaceous plants, such as Galium, etc.

The genus *Panolis* is a very distinct one, and somewhat difficult to locate satisfactorily; but the present position appears as good as any proposed, though it has been suggested that it might have been placed next after *Lycophotia,*

before the commencement of the *Orthosidi*. *Panolis Piniperda* (the Pine Beauty, No. 5), a very beautiful insect, was first discovered in England by Mr. F. Stephens, in 1810, near Hertford, and has since been captured in many other localities. The Caterpillar (No. 6) feeds on pine-trees in May and June, and is in some seasons so abundant on the Continent as to do considerable injury.

The genus *Glœa*, in the system I am following, is now restricted to a single species, though formerly containing several, which have been rather variously distributed by different authors. It is now represented solely by *G. Rubricosa* (No. 7), the abdomen of which is not depressed as in the discarded species; the antennæ are more hairy beneath, and the anterior wings slope more towards the inner angle, at the fringed edge. M. Boisduval places this species in *Orthosia*, and M. Guéené in *Tæniocampa*. The Caterpillar (No. 8) is very large in proportion to the size of the perfect insect. It is gray, with a brown dorsal line, and two white dots on each segment. It feeds on a kind of Dock, and the Moth appears at the end of March, frequenting beds of nettles, but it is a rare species.

The genus *Orthosia*, the type of the *Orthosidi*, has formed the subject of much revision, and appears even now in a very unsettled state. M. Guéené formed a large section of it into a genus termed *Tæniocampa*, in allusion to the distinct linear markings of the Caterpillars. M. Boisduval only partially adopted the principle of this subdivision, and endeavoured to found it upon the tree-feeding and herb-feeding nature of the Caterpillars, under the respective names of larvæ *Herbicolæ* and larvæ *Arboricolæ*. Mr. Stainton adopts in the main M. Boisduval's arrangement, by which the bulk of the species formerly in the genus *Orthosia* is placed in *Tæniocampa*, leaving only four to *Orthosia*. In the arrangement of the national collection, however, which is principally founded on the system of the late Mr. F. Stephens, the genus *Orthosia* is preserved nearly in its original state, without reference to M. Guéené's sub-genus *Tæniocampa;* the species, not according with the generally received characteristics of *Orthosiæ*, having been removed to other genera, or formed into new ones. The characters of the genus *Orthosia*, as it now stands, are: antennæ ciliated, and sometimes pectinated, in the males; the abdomen smooth and a little depressed; the fore wings thick, powdery, and sometimes shining; the markings more or less faint and indistinct in comparison with allied genera; and the wings, when in repose, forming the figure of a very sloping roof. The larvæ are smooth and velvety, and rather attenuated in front. They feed either on trees or herbaceous plants, and the transformation takes place in the ground, in a slight earthen cocoon, sometimes mixed with silk.

Orthosia Instabilis (the Clouded Drab, No. 9) is one of the most variable of the genus, as will be seen by reference to the pale variety (No. 10); and there are specimens exhibiting every intermediate degree both in colouring and marking.

Orthosia Stabilis (the Common Quaker, No. 11) is, on the other hand, as its specific name implies, as remarkable for the invariable character of its markings and general appearance.

Orthosia Miniosa (the Blossom Underwing, No. 12) is so different in the character of its markings from the other *Orthosiæ*, that it is probable it may be removed at no distant time to another genus; the Caterpillar (No. 13) having also some characters which help to distinguish this species from other insects in the genus.

The other species retained in this genus in the Museum collection are *O. Opima* (the Northern Drab), *O. Populeti* (the Lead-coloured Drab), *O. Gracilis* (the Powdered Quaker), *O. Munda* (the Twin-spotted Quaker), *O. Cruda* (the Small Quaker), *O. Lota* (the Red-line Quaker), *O. Macilenta* (the Yellow-line Quaker), *O. Neglecta* (the Neglected Rustic), *O. Sobrina* (the Scotch Rustic), *O. Congener* (the Allied Rustic), *O. Hyperborea* (the Mountain Drab), only two specimens of which are known, and *O. Ruticilla* (the Reddish Drab). Among these, the most remarkable are perhaps the pretty little *O. Cruda*, nearly a third smaller than any other species, and *O. Lota* with its fine red-toned anterior wings. The species, *Neglecta*, *Sobrina*, *Congener*, *Hyperborea*, and *Ruticilla*, are *queried* as true *Orthosiæ* in the Museum Catalogue.


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PLATE XVII.

No. 1.—The Brown-spot Pinion (*Anchocelis Litura*).
No. 2.—The Dotted Chestnut (*Dasycampa Rubiginea*).
No. 3.—The Caterpillar of the Dotted Chestnut.
No. 4.—The Chestnut (*Orrhodia Vaccinii*).
No. 5.—The Caterpillar of the Chestnut.
No. 6.—The Satellite (*Eupsilia Satellitia*).
No. 7.—The Caterpillar of the Satellite.
No. 8.—The Copper Underwing (*Amphipyra Pyramidea*).
No. 9.—The Caterpillar of the Copper Underwing.
No. 10.—The Mouse (*Scotophila Tragopogonis*).
No. 11.—The Caterpillar of the Mouse.
No. 12.—The Gothic (*Nœnia Typica*).
No. 13.—The Caterpillar of the Gothic.
No. 14.—The Bird's Wing (*Dypterygia Pinastri*).
No. 15.—The Feathered Brindle (*Aporophyla Australis*).

The genus *Anchocelis*.—The insects belonging to this genus have the antennæ of the males slightly pubescent, the abdomen not crested, but fringed with hair at the sides. The fore wings are pointed at the tip, slightly shining, with the veins often lighter than the ground colour, and the markings distinct. The wings, in repose, meet in a ridge over the body, sloping down either way. The larvæ are rather slender, and marked with distinct lines. They feed by night, upon low herbaceous plants, and burrow in the ground to undergo the change to the pupa state.

Anchocelis Litura (the Brown-spot Pinion, No. 1) is the *Phalæna N. Litura* of Linnæus, and was subsequently placed in the genus *Orthosia;* but was detached, and placed in his genus *Anchocelis* by M. Guénée. The Caterpillar is yellowish-green, with a dark dorsal line and a pale stripe on each side, and the head is brown. It feeds upon the Willow and other trees, and also on Trefoil. It is found in June, and the Moth, which is rather rare, in September.

There are two other species of *Anchocelis, A. Pistacina,* formerly *Orthosia Pistacina* (the Beaded Chestnut), and *A. Lunosa* (the Lunar Underwing), also formerly in the genus *Orthosia.*

A. Pistacium is a most variable insect, sometimes having very dark and strongly defined marks on a pale buff ground, and sometimes being almost entirely of a dark rich brown, with very indistinct markings. *A. Lunosa* has the hind wings finely marked with two brown bands, and moon-like mark near the centre.

The genus *Dasycampa* is a very modern one, and is founded upon the peculiarity of the Caterpillar of the only species which at present belongs to it.

The species *A. Rubiginea* (the Dotted Chestnut, No. 2), was formerly the *Orrhodia Rubiginea* of Hübner, but was separated from it by M.M. Guénée and Boisduval. The Caterpillar (No. 3) is clothed with tufts of very silky hairs, which, among a number of related genera all having smooth larvæ, is very remarkable. It feeds on Oak and various plants, but is very rare, as well as the perfect insect, which has, however, been taken at Norbury Park, and at Mickelham, Surrey. Collectors should look for it in autumn, when it has been taken by rubbing diluted sugar on the trunks of trees, a bait towards which it appears to be strongly attracted.

The genus *Orrhodia* of Hübner (the *Cerastis* of Ochsenheimer) is distinguished by the pubescent antennæ of the males, the broad and somewhat flattened thorax, which is not crested, by the blunt angles of the fore wings, the slight dentation of the edge of the hind wings, and by the position of the wings in repose, which are nearly flat. The Caterpillars of all the species are rather slender, and have the "plate" on the second segment well defined. They feed on low shrubs, concealing themselves by day, and burying themselves to undergo their change when full fed.

Orrhodia Vaccinii (the Chestnut, No. 4), formerly *Glæa Vaccinii,* is a very variable insect, two remarkable dark varieties having been formerly recorded as distinct species, under the specific names of *Polita* and *Spadicea.* The Caterpillar (No. 5) is found upon the common Bilberry, and the Moth, which is very common, appears in September, October, and November. It hybernates during the severe weather, reappearing in the following spring.

There are two other species of *Orrhodia—O. Ligula* (the Dark Chestnut), with dark anterior wings, which have one or more pale bands near the external edge, and *O. Erythrocephala* (the Red-headed Chestnut), with reddish-brown wings, and the head and thorax brightly ferruginous. This last has only been taken once in England (at Brighton), but is said to be common in some parts of France, where it is known as *O. Vaccinii.*

The genus *Eupsilia* has changed its name several times, that of Hübner, as being the earliest, having been eventually adopted in most systems. In this genus the body is flat, as in the last genus, but the wings are longer and more oblique at the tips, and the fringed edge is conspicuously dentated ; the antennæ at each joint have a tuft of minute hairs in the males. The larvæ are slender, velvety, and much attenuated towards the head.

Eupsilia Satellitia is the only British species, and is especially remarkable for the pretty white markings in the fore wings, which resemble a moon, or planet accompanied by two minute satellites. The Caterpillar is generally dark brown approaching black, but varies into dusky orange or greenish in some specimens ; care should be taken, in rearing these Caterpillars, not to place them in a box with others, as they are carnivorous, and will devour even their own species. They are found in summer, feeding on various trees and plants, and the Moth appears from September to November. It was once thought comparatively rare, but is now deemed a common species. This genus is the last of the *Orthosidi*.

The third sub-family of the *Noctuidæ* is termed that of the *Amphipyridæ*, and contains three genera—*Amphipyra*, *Scotophila*, and *Nœnia*.

The genus *Amphipyra* is distinguished, like the others of the group, by the remarkably recurved palpi ; the antennæ are slender, but slightly ciliated, the abdomen depressed, and tufted, the fore wings dentated at the fringed edge, and the hind wings more or less richly coloured.

Amphipyra Pyramidea is the only species. It presents all the characters above detailed. The fore wings are strongly marked, and the hind wings of a bright colour, from which it takes its popular name, "the Copper Underwing." The Caterpillar (No. 9) is remarkable for a conical protuberance near the tail. It feeds on Elm, Poplar, and other trees in May and June (often concealing itself in the bark) ; the Moth, which is common, appearing in August.

The genus *Scotophila* has also the recurved palpi. The fore wings are, however, of an almost uniform dusky tone, almost entirely without markings in some specimens, and they are not dentated at the edge. The hind wings are, however, of a somewhat similar coppery tone to those of the preceding genus. The only species, *Scotophila Tragopogonis*, is so named in consequence of the Caterpillar feeding almost exclusively on the *Tragopogon Pratense*; and has received its popular name, "the mouse," from the colour of the fore wings. The Caterpillars appear in May and June, and the Moth in July and August. They are sometimes found at that season in considerable numbers, huddled together beneath the loose bark of rotten trees. The supposed species called *S. Tetra* is now considered a mere variety of *Tragopogonis*.

The genus *Nœniæ* has also the recurved palpi of the other genera of this sub-family. The thorax and abdominal joints are strongly tufted, the abdomen is tufted at the extremity, and the wings have the apical margins notched. *Nœnia Typica* (the "Gothic," No. 12) is the only species. The Caterpillar has the twelfth segment angulated. It feeds at the roots of Nettles and some other plants in April, and makes a cocoon on the surface of the ground in May. The Moth appears in June and July, and is found in abundance fluttering over beds of Nettles.

The fourth sub-family of the *Noctuidæ* is that of the *Xylinidi*, comprising five genera—*Dypterygia*, *Aporophyla*, *Lythomoia*, *Xylina*, and *Calocampa*.

The genus *Dypterygia* was distinguished by Mr. Stephens, its founder, by its very highly crested thorax, its slender and nearly vertical palpi, the third stigma, or sub-spherical mark of the fore wings. The only species, *Dypterygia Pinastri* (the Bird's Wing, No. 14), is a remarkable and handsome insect, and, though somewhat rare, is often found where pines abound. The Caterpillar is dark brown, with blackish spots, and has two pale longitudinal lines and several oblique ones. It feeds on the Dock in spring, and the Moth appears in May and June.

The genus *Aporophila*, founded by M. Guéné for the reception of species closely allied to the *Xylinæ*, has been found the best place in which to locate the pretty insect formerly placed in the genus *Agrotis* as *A. Pascuea*. It appears to be the same species as that described by Rambur as *Xylina Australis*. *Aporophila Australis* (the Feathered Brindle, No. 15) has thus changed both its systematic names, *Xylina* and *Pascuea*. It is extremely rare, but has been taken at Yarmouth and at Lowestoft, and will doubtless be found in other places on the coast.


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PLATE XVIII.

No. 1.—The Flame (*Xylina Putris*).
No. 2.—The Golden-rod Brindle (*Lythomoia Solidaginis*).
No. 3.—The Sword Grass (*Calocampa Exoleta*).
No. 4.—The Caterpillar of the Sword Grass.
No. 5.—The Red Sword Grass (*Calocampa Vetusta*).
No. 6.—The Caterpillar of the Red Sword Grass.
No. 7.—The Light Arches (*Xylophasia Lythoxylea*).
No. 8.—The Dark Arches (*Xylophasia Polydon*).
No. 9.—The Clouded Brocade (*Hyppa Rectilinea*).
No. 10.—The Caterpillar of the Clouded Brocade.
No. 11.—The Crescent (*Hydræcia Leucostigma*).

In this plate the genera of the fourth sub-family of *Noctuidæ*, the *Xylinidi*, are continued.

The genus *Xylina* is distinguished by short and nearly horizontal palpi, and simple or but slightly serrated antennæ in the males; the fore wings are narrow, the fringed edge slightly denticulated, and the thorax is square. The Caterpillar is smooth, or but very slightly clothed with hairs. There are six species of *Xylinæ* in the system which I am following, but they do not group very naturally, and, in some recent arrangements, most of them have been distributed in other genera.

Xylina Putris (the Flame, No. 1) is one of the smallest of the genus. The Caterpillar is described as being of a pale yellowish brown, with pale stripes, a yellow line down the back, and minute black spots; it feeds on various grasses in spring, and the Moth appears in June. It is common everywhere. In another recent arrangement it is called *Axilia Putris*, while *X. Conspicillaris*, is made *Xylomyges Conspicillaris*. The other species are *X. Petrificata*, *X. Conspicillaris*, *X. Semibrunnea*, and *X. Rhizolitha*, the last two presenting characters which appear to ally them more closely with the genus *Calocampa*.

In the genus *Lythomoia*, the antennæ of the males are furnished with short brushes of hair on the under side; the fore wings are rather long, and deflexed when at rest, and the abdomen is not depressed. The Caterpillars are smooth, with the last segment but one rather elevated, and the spiracular line very distinct.

Lythomoia Solidaginis (the Golden-rod Brindle, No. 2) is local, and generally rare, but occasionally taken in great abundance, as at Staley Bridge, near Manchester, in 1837. The Caterpillar is deep brown, with slender dorsal line, and broader lateral line of white bordered with black; there are also on the back darker blotches, variegated with yellow spots. It feeds on the Bilberry.

The genus *Calocampa*, so named from the beauty of the Caterpillars, is at once distinguished by the size of the insects, which are much larger than those of any of the neighbouring genera. The antennæ are robust and slightly ciliated in the males, and the thorax is remarkably square. The great length and narrowness of the wings is another leading characteristic, and in repose they lie partly folded and partially crossed. The Caterpillars are conspicuously marked, and attenuated at each extremity. They undergo their change at a considerable depth in the earth.

Calocampa Exoleta (the Sword Grass, No. 3) is one of the handsomest of the *Noctuidæ*, and frequently measures two and a quarter inches or more across the extended fore wings. The Caterpillar (No. 4) feeds on various plants, among which the *Iris* and *Serratula Tinctoria* are named. The Moth appears at the beginning of summer and also in the autumn. It is rather rare, though very widely distributed.

Calocampa Vetusta (the Red Sword Grass, No. 5) is rather less than the preceding species, and also distinguished by the stronger denticulation of the fringed edges of the anterior wings, the stronger markings near the margin, and the fainter or nearly obsolete anterior stigma. It is also of rather a richer colour, tending to a reddish tone. The Caterpillar (No. 6) is, as shown, entirely distinct in its markings. It feeds on plants of the *Carex*, or Sedge tribe, and the Moth appears at the beginning of September. It is very rare.

Apamidi forms the fifth sub-family of the *Noctuidæ*, and is one of the most extensive. The genera of which it is composed are *Xylophasia, Hyppa, Hydræcia, Apamea, Miana, Celæna, Hama,* and *Crymodes; Apamea* being of course the type round which the other genera are grouped.

The genus *Xylophasia,* formerly united by some naturalists with *Xylina*, is yet sufficiently distinct, especially in its preparatory stages. The antennæ of the males are long and only slightly pubescent; the palpi are larger than in *Xylina*, and turned upwards; the abdomen is coronated at each segment, and the fringed edges of the wings sinuated. The Caterpillars are large, dull coloured, and shining, and have small wart-like spots or tubercles. There are six species, all grouping very naturally together.

Xylophasia Lithoxylea (the Light Arches, No. 7) is a common and widely-dispersed species. The Caterpillar is said to be green, with white dots, and lines at the sides; while others declare it to be as yet unknown, though the perfect insect is so common.

Xylophasia Polydon (the Dark Arches, No. 8) is equally common with the preceding, and appears about the same time. The Caterpillar feeds on the roots of grasses, is of a pale ash colour, with shining black tuberculated specks, and the head and anal segments are also black.

The other species are *X. Sublustris, X. Rurea, X. Hepatica,* and *X. Scolopacina*, all of which resemble one or other of the two species figured, except *X. Scolopacina* (the Slender Clouded Brindle), which is much smaller than any of the other species. It is of a more yellow tone, and much less streaky in the markings. It is not improbable that, like the species *Rectilinea*, it may be eventually removed to another genus. It is very rare.

The genus *Hyppa* consists at present of a solitary species (*Rectilinea*), removed from *Xylophasia.* The specimen, *X. Rectilinea* (the Clouded Brocade, No. 9), upon which the first claim to a British insect of this genus was based, was captured a few years ago by Mr. Marshall. The Caterpillar (No. 10) is from Hübner.

The genus *Hydræcia* was formed by M. Guéné, to receive certain species previously placed in *Apamea,* which presented certain differences, too technical for detail in a popular work, which seemed to offer sufficient inducement for their separation. The principal features of the group are, excessively short palpi, scarcely extending beyond the head; the antennæ filiform, or slightly crenulated in the males. The head has a thick tuft of scales on the crown, and the abdomen is tufted down the back. The wings are slightly notched at the edge, and the posterior stigma generally very distinct, and often margined with white. The Caterpillars are short, and attenuated at each end; living on grass, generally in the stem.

Hydræcia Leucostigma (the Crescent, No. 11) is larger than any species remaining in the genus *Apamea,* and has the stigma crescent-shaped, and white, from which it derives its popular name. The Caterpillar is of a dirty whitish colour, rather brown on the back, with some dark spots; the head is entirely brown, and the second segment black. It feeds in the flower stems of the *Iris Pseudacoris.* It is a very local insect, but was taken in great abundance at Whittlesea Mere, in July, 1822, and has since been taken in many places about the beginning of August, feeding on sugar placed as a bait on the trunks of fruit-trees.


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PLATE XIX.

No. 1.—The Golden Ear (*Apamea Nietitans*).
No. 2.—The Double-lobed (*Apamea Ophiogramma*).
No. 3.—The Marbled Minor (*Miana Strigilis*).
No. 4.—The Cloaked Minor (*Miana Furuncula*).
No. 5.—A pale variety of the Cloaked Minor.
No. 6.—Haworth's Minor (*Celæna Haworthii*).
No. 7.—The Rustic Shoulder-Knot (*Hama Basilinea*).
No. 8.—The Caterpillar of the Rustic Shoulder-Knot.
No. 9.—The Uni'n Rustic (*Hama Connexa*).
No. 10.—The Brindled Ochre (*Crymodes Templi*).

The genus *Apamea*. In this genus the insects are much smaller than in *Mamestra*, the antennæ of the males are slightly pubescent, the palpi are very short and slightly elevated, the abdomen is rather long, and crested. The fore wings are slightly notched at the fringed edge, and the markings are generally distinct, especially the posterior stigma, which is often margined with white. The Caterpillars are rather short and slightly attenuated at each end, though the head is generally of moderate size. They are longitudinally striped, and the whole skin is smooth, tough, somewhat glossy, and often sprinkled with raised shining dots. They live most commonly on grasses, often in the stem, and generally descend into the earth to undergo their transformation. In the arrangement I am following, this genus contains only four British species.

Apamea Nictitans (the Golden Ear, No. 1) has a shining golden tinge, impossible to imitate closely in a coloured engraving, and from this it is that it takes both its specific and popular names. It appears in the winged state in July and August. The Caterpillar is unknown.

Apamea Ophiogramma (the Double-lobed, No. 2) is a very distinct species. Like the preceding, it is by no means common, but is sometimes taken in marshy situations near London. The Caterpillar is unknown.

Apamea Unanimis (the Uniform Rustic) is disputed as British, but a specimen is said to have been taken by Mr. Dale, in Scotland, and there are one or two other instances of its capture.

Apamea Didyma (the Common Rustic) is very variable in colour, and common everywhere. The Caterpillar is dull gray, or sometimes greenish, with sub-dorsal and spiracular stripes of dull red.

The genus *Miana* is composed of the smaller insects of this family, few of them measuring an inch in the full expanse of the wings, and some of the species not extending to three-quarters of an inch. They are popularly known as the Minors. The palpi are short and porrected obliquely; the antennæ are short, thick, and pubescent in the male; the abdomen is rather slender, and crested; and the markings are generally very distinct. The Caterpillars are small and attenuated at each end, of dull colour with pale stripes. They feed on grasses, often in the stem, and the Chrysalis is contained in a slight earthen cocoon. There are five species.

Miana Strigilis (the Marbled Minor, No. 3) is a very variable insect, a dusky variety having been made by some a distinct species, under the name of *M. Latruncula*, and a still darker variety, *M. Æthiops*, or the Black-a-Moor. The larva is described as grayish, paler underneath, and with black spiracles, and having paler lines, sometimes of a violet tone, the head being brown or yellowish. It is very common, and the perfect insect is found in June and July.

Miana Furuncula (the Cloaked Minor, No. 4) is almost as variable as the preceding, some specimens being of palish straw-colour, with the markings indistinct (one of which is represented at No. 5). In others the marks

are of more decisive and stronger character than in the medium specimen selected for illustration. It is a very common species, but as yet unknown in the Caterpillar stage.

The other species are—*M. Fasciuncula* (the Barred Minor), the fore wings of which are generally of a rich, light reddish-brown, and having a distinct band running across the centre, and another fainter exterior band. *M. Literosa* (the Rosy Minor), which is prettily marked, and has a rosy flush, from which it derives its popular name. It is considered rare though taken occasionally in Kent, Essex, Norfolk, and some other places. A new species, *M. Expolita*, taken for the first time at Darlington, in 1855, is described as having the fore wings of a shining grayish-brown, with a reddish tinge, the markings being of similar character to those of the other species, but all tinged with the ground colour ; the hind wings are deep gray, with paler fringe.

The genus *Celæna* is nearly allied to the preceding, but the insects assigned to it are distinguished by the greater breadth of the anterior wings ; by their rounded form, by a conspicuous tuft on the crown of the head, and some other characters.

Celæna Haworthii (Haworth's Minor, No. 6) is generally considered a rare insect, but has been taken at Whittleseamere, Windermere, and in some other places. It is subject to considerable variations, some of the varieties having been distinguished as *C. Hibernica, C. Lancea*, and *C. Tripuncta*.

The genus *Hama* contains six species, all more or less nearly allied to those which compose the genus *Chareus ;* they are, however, distinguished by the more slender and less ciliated antennæ of the males, and by the shorter palpi. The eyes are large and naked, and the thorax is scarcely crested, the fore wings are slightly dentate, and the markings distinct ; the larvæ are thick, dark coloured, with pale lines and distinct spots ; and the transformation takes place in the earth.

Hama Basilinea (the Rustic Shoulder-Knot, No. 7) is easily distinguished by the sharp, dark, branching line near the shoulder. The Caterpillar (No. 8) feeds on grasses in the autumn, and the Moth appears in the following June. It is very common.

Hama Connexa (the Union Rustic, No. 9) is very rare, but has been taken at Sheffield and some other places.

Hama Testacea is grayish-ochreous, tinged with brown, having generally three tolerably distinct blackish streaks at the base. The larva, according to Treitschke, is dull flesh-colour, with the head, and a mark on the second segment pale brown. It feeds on the lower parts of the stems of grass.

The other species, some of which have been distributed among the genera *Apamea, Orthosia*, or *Mamestra*, in other arrangements, are *H. Ypsilon* (the Dingy Shears) ; *H. Sordida* (the Large Nutmeg) ; and *H. Furva* (the Dusky Brocade).

The genus *Crymodes* has been established by M. Guéné for the reception of certain species which are nearly related to those contained in *Miselia* and in *Polia*, but differing in some respects from both.

Crymodes Templi (the Brindled Ochre, No. 10) is the only British species yet placed in this genus ; it was located among the *Miseliæ* by Mr. Westwood, and with the *Poliæ* by Mr. Stephens ; but Mr. Doubleday, following M. Guéné, made it *Crymodes Templi*. It is very rare, but has been taken in Devonshire, and in the neighbourhood of Liverpool, and Birmingham. The Caterpillar is unknown.

With the exception of *H. Connexa*, the whole of the insects from which our Plate was drawn were furnished by Mr. Gardner, of 52, High Holborn, as were the greater portion of those of the preceding Plates.


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PLATE XX.

No. 1.—The Small Angleshades (*Euplexia Lucipara*).
No. 2.—The Caterpillar of the Small Angleshades.
No. 3.—The Dot (*Mamestra Persicariæ*).
No. 4.—The Caterpillar of the Dot.
No. 5.—The Bright-line Brown Eye (*Mamestra Oleracea*).
No. 6.—The Caterpillar of the Bright-line Brown Eye.
No. 7.—The Dark Brocade (*Hadena Adusta*).
No. 8.—The Shears (*Hadena Dentina*).
No. 9.—The Caterpillar of the Shears.
No. 10.—The Early Gray (*Xylocampa Lithoriza*).
No. 11.—The Bordered Gothic (*Neuria Saponariæ*).
No. 12.—The Feathered Gothic (*Heliophobus Popularis*).

With this Plate commences the illustration of the sixth sub-family of *Noctuidæ*, the *Hadenidi*, embracing thirteen genera. Among these, *Polia* and some others contain insects of comparatively large size, some measuring nearly two and a-half inches in the expanse of the wings; the others are of moderate size, none being so small as the *Mianæ* and *Celænæ* among the *Apamidi*. In the perfect state the insects composing this family have the antennæ rather long, and in some species, as *Valeria*, strongly ciliated; the abdomen more or less crested; the fore wings thick and strongly maculated with many varieties of markings; and in repose the wings lie in the form of a strongly inclined roof. The Caterpillars are of rather long proportion, not shining, and being generally without raised spots. Some have the twelfth segment humped, and they bury themselves, more or less deeply, to undergo their transformation, forming generally an oval cocoon.

The insects of the genus *Euplexia* have the antennæ pubescent, or rather bristled, in the males, and the palpi are slightly elevated, the abdomen thickly fringed at the sides, with a thicker crest on the third segment. The fringe of the fore wings is dentate, they are broad and thick, and slightly folded in repose. The Caterpillars are velvety, and thicker in the posterior segments, which are angulated, the head and anterior segments being small.

Euplexia Lucipara (the Small Angleshades, No. 1) is rare as a British species. The Caterpillar (No. 2) feeds on *Echium Vulgare* and *Anchusa Officinalis* in autumn, and the Moth appears in June. It has been found in the woods round London, in Devonshire, Hampshire, and other places. This is the only British species.

The genus *Mamestra*. The insects in this genus have the antennæ somewhat long, and slender, and simple, in both sexes. The thorax is generally double-crested, and the abdomen crested on the first segment. The fore wings are more or less denticulated at the fringed margin, and are generally of dark colours and rather distinctly marked, having frequently a W-like mark in the light waved band nearest the external edge. The *Mamestræ* are rather large, often measuring one and three-quarter inches across the extended wings. The Caterpillars are smooth and elongate, and feed at night on the leaves of low plants, concealing themselves during the day. They undergo their change in the earth.

Mamestra Persicariæ (the Dot, No. 3) is one of the most remarkable, as well as the commonest of the genus, the striking effect of the bright white stigma, in the midst of the darkly tinted fore wings, being the origin of its popular name, the "Dot." The Caterpillar feeds, in preference, upon the common garden weed *Polygonum Persicaria*, from whence its specific name, *Persicariæ*. It is found in the autumnal months, and the perfect insect appears in the following June.

Mamestra Oleracea (the Bright-line Brown Eye, No. 5) is still more common than the preceding. The Cater-

pillar (No. 6) feeds on plants of the cabbage tribe, sometimes committing great ravages in our gardens. It appears in the autumn, and the Moth early in the following summer.

There are six other species :—*M. Pisi* (the Brown Moth), *M. Suasa* (the Dog's Tooth), *M. Chenopodii* (the Nutmeg), *M. Nigricans* (the Dusky Nutmeg), *M. Albicolon* (the White Colon), and *M. Brassicæ* (the Cabbage Moth). Three of these are, like the two preceding species, very common; but the other three, *M. Nigricans*, *M. Albicolon*, and *M. Suasa*, are very rare. *Nigricans* has been taken in the New Forest and at Darenth Wood ; *Albicolon* has been found in Cumberland ; and *Suasa*, though very common on the Continent, has been taken only once or twice at Birch Wood, in Kent, in Norfolk, and in the Lake District.

The genus, *Hadena*, the type of the *Hadenidi*, have the palpi bent upwards, the antennæ simple, or only slightly ciliated in the males. The fore wings are undulated at the fringed edge, and are rather narrow, and all the species are generally rather smaller than those of the preceding genus. The Caterpillars are smooth, of rather long proportion, and sometimes rather brightly coloured. The Chrysalids are subterranean. In its present restricted form this genus contains eleven species.

Hadena Adusta (the Dark Brocade, No. 7) is one of the insects of this class upon which our old collectors conferred the name of Brocades, from the rich shining patches of very exquisitely varied tints on the anterior wings which distinguish many of the *Hadenæ*. It is a large insect, often measuring one and three-quarter inches across the extended wings. It is a rather rare species, but occurs in the woods of Kent and Surrey, and has been found in Essex, on Chatmoss, and in other localities. The Caterpillar is said to be of dull reddish, marbled with green on the back, the dorsal line being only indicated by dark blotches at the joints. It feeds on several low-growing plants.

Hadena Dentina (the Shears, No. 8) is common everywhere. The Caterpillar (No. 9) is dull greenish gray, browner on the back, with a row of dark triangular spots on either side of the dorsal line. The head is reddish. It feeds on Dandelion, preferring the lower leaves or roots.

There are several varieties of this species, which have been named, as distinct species, but they only differ in the tone of colouring, the disposition of the markings remaining the same, or very nearly so.

The other species are :—*H. Satura* (the Beautiful Arches), *H. Arctica* (the Barred Arches), *H. Assimilis* (the Northern Arches), *H. Thalassina* (the Pale-shouldered Brocade), *H. Genistæ* (the Light Brocade), *H. Contigua* (the Beautiful Brocade), *H. Gemina* (the Brown-pinioned Brocade), *H. Glauca* (the Glaucous Shears), and *H. Protea* (the Brindled Green). Among these, some, though common, are very beautifully marked, as *Thalassina*, *Genistæ*, and *Contigua*. Others are very rare, as *Gemina*, *Glauca*, and *Protea*.

The genus *Xylocampa*. The insects, for the reception of which this genus was established by M. Guéné, have the antennæ of the males slightly pubescent, or velvety, but not ciliated, with a tuft of hair at the base. The abdomen is crested on the anterior segment; the markings of the fore wings are distinct, and the fringe long. The Caterpillars are long and attenuated at each end, but thick in the middle, with an eminence on the twelfth segment.

Xylocampa Lithoriza (the Early Gray, No. 10). The only English species has been recently removed from *Hadena* to this genus, on account of several peculiarities, both in the preparatory and perfect states, which were at variance with the true character of the *Hadenæ*. The colour of the Caterpillar is rather a grayish buff, with a paler dorsal line, bordered by brown spots ; the twelfth segment is rather humped. It feeds upon honeysuckle in the summer months, and the perfect insect appears as early as the following March or April, frequenting the flowers of the Sallow. It is a common insect, and very widely distributed.

The genus *Neuria*. The insects of this genus have antennæ pubescent in the males, and slightly so in the females. The fore wings are distinguished by the pale colour of the nervures, or neurations, which thus become very conspicuous; the name of the genus being founded on this peculiarity.

Neuria Saponariæ (the Bordered Gothic, No. 11), the only British species, was formerly, like *Xylocampa Lithoriza*, classed with the *Hadenæ*, though always considered a very distinct species, its general character agreeing much better with M. Guéné's new genus *Neuria*. The Caterpillar probably varies considerably in colour, as it is described by some as being of a reddish gray colour, streaked with brown, and by others as entirely green, without any markings; it possibly changes colour at different ages. It feeds on different species of *Saponaria* and *Silene*, in July and August, and the Moth appears the following summer. It is not rare.

The genus *Heliophobus* is conveniently placed next to *Neuria* in the system I am following, as *H. Popularis* so closely resembles *N. Saponariæ*, that, but for the strongly bipectinated antennæ, it might be mistaken for it. The bipectinated antennæ in the perfect state, and the striped Caterpillars in the preparatory stage, are, in fact, the chief characteristics which distinguish the insects of this genus from those of *Neuria*. The Caterpillars conceal themselves during the day, never emerging to feed till after dark, as expressed in the generic title *Heliophobus*, which signifies, dread of the sun.

Heliophobus Popularis (the Feathered Gothic, No. 12) has received its popular name in allusion to the feather-like antennæ which so plainly distinguish it from the Bordered Gothic, just described. It is widely distributed, and not rare. The Caterpillar is said to be of a metallic brown, with whitish lines ; the marks, or plates, on the second and anal segments being black.

There are two other species, *H. Hispidus* (the Beautiful Gothic) and *H. Dumerilii* (the Pale Feathered Rustic), both rather rare. The former has been taken at Plymouth, the Isle of Portland, and one or two other places ; the latter is possibly only a pale variety.

PLATE XXI.

No. 1.—The Feathered Ear (*Pachetra Leucophæa*).
No. 2.—The Caterpillar of the Feathered Ear.
No. 3.—The Campion (*Dianthecia Cucubali*).
No. 4.—The Caterpillar of the Campion.
No. 5 & 5½.—The Caterpillar of the Lychnis (*Dianthecia Capsincola*).
No. 6.—The Beautiful Coronet (*Dianthecia Albimacula*).
No. 7.—The Dusky Sallow (*Eremobia Ochroleuca*).
No. 8.—The July Chi (*Polia Chi*).
No. 9.—The Large Ranunculus (*Polia Flavicincta*).
No. 10.—The Caterpillar of the Large Ranunculus.
No. 11.—The Feathered Ranunculus (*Eumichtis Lichenea*), will be figured in Plate 23.
No. 12.—The Green Arches (*Eurois Herbida*).
No. 13.—The Caterpillar of the Green Arches.
No. 14.—The Gray Arches (*Eurois Nebulosa*).
No. 15.—The Caterpillar of the Gray Arches.
No. 16.—The Great Brocade (*Eurois Occulta*).
No. 17.—The Caterpillar of the Great Brocade.

The genus *Pachetra*. This genus was established by M. Guéené, in 1841. The characteristics of the insects it is intended to include are, antennæ of male strongly pectinated, abdomen crested in both sexes, the fore wings slightly undulating at fringed edge, and being robust, pubescent, and distinctly marked; the hind wings being semi-transparent, and in the only British species having a light border at the edge. The Caterpillar is thick, velvety, and thickens towards the tail. It lives concealed near the roots of grass, and a cocoon is formed in that situation, or in moss.

Pachetra Leucophæa (the Feathered Ear, No. 1) is by some still retained in the genus *Heliophobus*, though very distinct from the other species. It is very rare in this country, having never been taken since the year 1816 (near Bristol), till within the last few years, when a few specimens have been captured in other places. The Caterpillar (No. 2) is rather variously described; according to M. Guéené it is grayish-yellow, with a pale, ochreous, dorsal line, and the head and plate on second segment light brown.

The genus *Dianthecia* is composed of a group of insects which in the larva state generally feed on plants of the *Dianthus* family, from which the name is derived. Most of the British species were formerly classed in the genera *Hadena* and *Miselia*, but have been separated in deference to the recent arrangement of M. Boisduval. The insects of this genus are distinguished by pubescent antennæ in the males, the abdomen crested at base in the female, and the ovipositor somewhat conspicuous. The front wings have distinct markings, the hind wings having a small angular light patch at the anal angle. The larva is smooth and velvety, attenuated at each end, and having dark diagonal marks along the back. There are five species.

Dianthecia Cucubali (the Campion, No. 3) is a remarkably handsome insect, and particularly distinguished from the following species by the union of the two stigmas in the fore wings, by means of their light ochreous outlines. The Caterpillar (No. 4) feeds on different kinds of *Lychnis*, and the Moth is found during the summer months. It was formerly considered rather rare, but has recently been found in some plenty at Cambridge, Scarborough, and other places.

Dianthecia Capsincola (the Lychnis) is a common and widely-distributed insect, and may be distinguished from the more beautiful *D. Cucubali* by the separation of the stigmas. The Caterpillar feeds on the seeds in the capsules of the common hedge *Lychnis*. It is green spotted with black when young (No. 5), but afterwards becomes brown, with the diagonal marks as shown at No. 5½. The perfect insect appears both in June and September, being probably double brooded.


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Dianthecia Albimacula (the Beautiful Coronet, No. 6) is as rare as the preceding species is plentiful, the only British specimen being in the British Museum. It was taken near Birch Wood, Kent, in 1816. The Caterpillar, according to M. Guéné, is ochreous-yellow, with a gray line down the back, which has a series of short diagonal lines on each side of it. It feeds on *Silene Nutans*.

The other species are *D. Perplexa* (the Tawny Shears) and *D. Conspersa* (the Marbled Coronet); of these neither are common, and *D. Perplexa* may be considered rare, though it has been taken at Bristol, Cambridge, Darenth Wood, and other places.

The genus *Eremobia*. In this genus the males are distinguished by ciliated antennæ, the abdomen is crested in both sexes, and the fore wings are undulated at the fringed edge. The Caterpillars are handsomely marked with conspicuous black dots and marks, and the head is large. It feeds, exposed, on different grasses.

Eremobia Ochroleuca (the Dusky Sallow, No. 7) is the only British species. It appears in July, frequenting exposed heaths and commons, especially those of Kent and Surrey, but it is not abundant. The Caterpillar feeds on grasses, and is a conspicuous object from its bright bluish-green colour, with yellow lateral stripes and numerous black markings.

The genus *Polia*. This genus, which, according to arrangements of English authors, contained till recently a number of species, among which were most of the largest and finest of our native *Noctuidæ*, has been restricted, in later arrangements, to a much smaller scope, and now, in fact, contains but four, and in some systems only two species, the others having been removed to *Miselia*, *Eurois*, and other genera. The insects contained in this genus, as it now stands, are distinguished by the slightly ciliated antennæ of the males, the elongated abdomen, crested on the anterior segments, and the markings of the fore wings having a mottled character. The Caterpillars are long and somewhat slender, of lively but generally of nearly uniform colour, which last feature distinguishes them from those formerly of this genus that have been removed. They have the head rather large and the pupa is enclosed in a subterranean cocoon.

Polia Chi (the July Chi, No. 8) is one of the small kinds still retained in the genus. The Caterpillar is green, without any markings beyond a dorsal and a lateral stripe, and therefore agrees with the characters now established. It feeds on the Common Wild Columbine and many other plants, the Moth appearing in July. It is an abundant species in the north.

Polia Flavicincta (the Large Ranunculus, No. 9) is a much larger insect than the preceding, but not so large as those removed from the genus. It is found in August and September, and is rather a common species. The Caterpillar (No. 10) feeds on Lettuce, Dock, Currant, and many other plants and shrubs, and is of the true character required for those now admitted to the genus, being slender and of nearly uniform colour.

The other species still retained in the genus *Polia*, in the system I am following, are *P. Serena* (the Broad Barred White) and *P. Dysodea* (the Ranunculus), both small species. The Caterpillars of these last named species are both strongly marked, and are shorter and thicker than those of the insects now considered true *Poliæ*; they have, therefore, in some arrangements been excluded from the genus.

The genus *Eumichtis* will be described in Plate 23.

The genus *Eurois*. To this genus, established by Hübner in 1816, are now removed most of the finest species formerly placed by English entomologists in the genus *Polia*. Some, disregarding the previous claim of the title established by Hübner, have taken M. Guéné's name, *Aplecta*, as the title of the genus now adopted for the reception of these insects. The characters of the genus *Eurois* of Hübner, as well as of the genus *Aplecta* of M. Guéné, are, antennæ pubescent in male, abdomen long, hairy, and slightly depressed, and only slightly crested on the anterior segment. The fore wings are dentate, or toothed at the fringed edge, and their stigmas and other markings are very clear and distinct. The larvæ are smooth, rather thick, and generally with oblique marks along the back, and other strong maculations.

Eurois Herbida (the Green Arches, No. 12) is one of the handsomest of the genus, but the fine green tone of some of the markings often fades very rapidly in a collection. The Caterpillar (No. 13) exhibits clearly the characters, which, among others, have caused the separation of this group of species from the old English genus *Polia*.

It feeds on *Cochlearia Armoracea*. The perfect insect appears in June, but was formerly considered rare, though widely-dispersed, having been taken at Darenth Wood, in Norfolk, and as far north as Lanark. More recently it has been taken in some abundance at Brighton, at Hull, and other places.

E. Nebulosa (the Gray Arches, No. 15) is one of the largest of the new group, sometimes measuring near two and a-quarter inches across the expanded wings. It is a widely-dispersed and common species, often found sitting on the trunks of trees in June. The Caterpillar (No. 16) feeds on *Verbascum Thapsus*.

E. Occulta (the Great Brocade, No. 16) is the largest of the group, and, indeed, perhaps of the whole of the extensive family of the *Noctuidæ*, sometimes measuring nearly two and a-half inches across the wings. The Caterpillar (No. 17) feeds on Lettuce, Dandelion, etc., in May, the Moth appearing in July. It may be considered a rare insect, though it has been taken at Birkenhead, at Edinburgh, in the Lake District, in Epping Forest, at Dover, and other places.

The other species are *E. Advena* (the Pale Shining Brown) and *E. Tincta* (the Silvery Arches); the first, an inconspicuous insect of nearly uniform pale brown, the markings being very obscure; the second is very handsome in appearance and midway between *Occulta* and *Nebulosa*, and nearly as large. It is rare, but has occurred in several localities, as Plymouth, Worcester, Birch Wood, etc., etc.


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PLATE XXII.

No. 1.—The Wild Arrach (*Trachea Atriplicis*).
No. 2.—The Caterpillar of the Wild Arrach.
No. 3.—The Portland Moth (*Hapalia Præcox*).
No. 4.—The Marvel-du-Jour (*Agriopis Aprilina*).
No. 5.—The Caterpillar of the Marvel-du-Jour.
No. 6.—The Green Brindled Dot (*Valeria Oleagina*).
No. 7.—The Caterpillar of the Green Brindled Dot.
No. 8.—The Ealing's Glory (*Miselia Oxyacanthæ*).
No. 9.—The Double-spot Brocade (*Miselia Bimaculosa*).
No. 10.—The Peach Blossom (*Thyatira Batis*).
No. 11.—The Caterpillar of the Peach Blossom).
No. 12.—The Buff Arches (*Thyatira Derasa*).
No. 13.—The Caterpillar of the Buff Arches.

The genus *Trachea*, of Hübner, as at present restricted, contains but one British species. The genus is distinguished by the antennæ being simple in both sexes, by the squareness of the thorax, which is crested in the middle, and by the tufts on the segments of the abdomen. The fore wings are somewhat elongate and triangular; the palpi have the terminal joint distinct and knob-like. The Caterpillars are smooth, and the penultimate segment is somewhat angulated, as in those of the *Mamestræ*.

Trachea Atriplicis (the Wild Arrach, No. 1), by some placed in the genus *Hadena*, generally measures about an inch and three-quarters across the expanded wings. It is a beautiful insect, and considered rare, though it has been taken in various districts. The Caterpillar (No. 2) is generally of the colour of the one figured, but from the coloured figure of Rösel, it would seem that it is occasionally flesh-coloured. It feeds on *Atriplex hortensis*, and some kinds of Dock. The perfect insect appears in June and September.

The genus *Hapalia* now receives its original name, that adopted by Hübner in 1818, in preference to the later denomination, *Actebia*, adopted by Stephens. The antennæ are slightly ciliated beneath in the males; the palpi are short and obtuse; the fore wings narrow and truncated. The Caterpillar is smooth, and undergoes its change in the earth. There is but a single British species.

Hapalia Præcox (the Portland Moth, No. 3) is a very handsome insect, the green tone of the anterior wings, with their white and black markings, forming a striking and agreeable contrast with the rich brown of the hinder ones. The Caterpillar is brownish on the upper side, with a slender dorsal line of white, irregularly bordered with black; the sides are grayish, powdered with black specks. It is found in May, feeding on the *Galium verum*, and the Moth appears in August. It appears to be a coast insect, having been first found in the Isle of Portland, and subsequently near the coast, in Ireland, and in the north of England; but it is still rare.

The genus *Agriopis*, founded by Boisduval, contains but a single British species, removed from the *Miseliæ* on account of the somewhat flattened form of Caterpillar. The insects forming the genus *Agriopis*, as defined by Boisduval, have the antennæ pubescent, with a tuft of hairs at the base; the abdomen is robust and slightly crested, and the fore wings thick, with very distinct lines and markings. The larvæ feed on trees, in the bark of which they conceal themselves during the day. They burrow very deeply in the ground to undergo their change, the pupa being enclosed in an earthen cocoon.

Agriopis Aprilina (the Marvel-du-Jour, No. 4) is a remarkably fine insect; the pale green of the fore wings being beautifully variegated with markings of black and white, and the hind wings brown, with pale bands nearly

white. The Caterpillar (No. 5) is, as referred to above, rather flattened in its form ; in its colour it varies considerably, but is generally reddish gray, the dorsal markings being nearly black, variegated and streaked with paler tones. It feeds on the Oak, and there are probably two broods in the year, as the perfect Moth appears both in April and October. It is a common species, and the pupæ are often found by digging at the roots of the trees which the Caterpillar feeds on, such as the Oak, Beech, Apple, etc.

The genus *Valeria* is distinguished by the bipectinated antennæ of both sexes, the pectinations in those of the male being the strongest. The thorax and abdomen are crested, and the long fringe of the fore wings strongly dentated. The larvæ feed exposed on shrubs. The pupæ are subterranean, and enclosed in a cocoon of earth and silk.

Valeria Oleagina (the Green Brindled Dot, No. 6) is the only British species. It is extremely rare, but is reported to have been found in various localities, as Richmond Park, near Bristol, in South Wales, and in Scotland. Mr. Stainton, however, only gives one place of capture, Fishguard, in Pembrokeshire, in July, 1800. The Caterpillar (No. 7) has the segments next the head larger than the head, and those next the tail attenuated. It feeds on Blackthorn in the spring, and the Moth appears soon after Midsummer.

The genus *Miselia*, formerly containing six or more species, in English arrangements, is now reduced to two. The characters are, the antennæ of the males thickened, and the abdomen, which is crested, slender in the males, but remarkably robust in the females. The larvæ are rather flattened beneath, and convex above, and have the twelfth segment somewhat humped. The pupæ are subterranean, and enclosed in a cocoon of earth and silk.

Miselia Oxyacanthæ (Ealing's Glory, No. 8) was formerly considered rather rare, though widely dispersed ; but recent collectors pronounce it a common species. The Caterpillar is reddish brown, marbled with black, white, and a deeper tone of brown, with a slender dorsal line of black. It feeds on the Hawthorn and Sloe, in May, and the Moth appears in September and October.

Miselia Bimaculosa (the Double-spot Brocade, No. 9) is extremely rare ; only one capture, in fact, is recorded, that of the specimen in the British Museum, taken near Bristol, in 1815. The Caterpillar has two protuberances on the posterior segment ; it is brownish in colour, and dotted near the head ; it is also speckled with minute white dots, and the spiracular line is dark above. It feeds on the Elm.

The genus *Thyatira* is at once distinguished by its peculiar markings, to which those which generally characterise the family entirely give place. The two species of which it is composed not only differ in this respect from the rest of the family, but also from each other, insomuch that more than one entomologist has proposed making them separate genera, as they differ in anatomical structure, as well as in their markings, and also in their preparatory stages, the Caterpillars being strikingly different in general character. They have, at the same time, some good generic characters in common. The antennæ are rather short and pubescent ; the abdomen is slender, and crested on the first segment only.

Thyatira Batis (the Peach Blossom, No. 10) is one of the most beautiful of our native Moths. It is found in many parts of the country, in some places abundantly, as at Huddersfield and Lyndhurst, according to Mr. Stainton. The Caterpillar (No. 11) is of very singular character, the peculiar humps on several of the segments resembling those of the *Notodontæ*. It feeds on Bramble ; and the Moth appears in June and July, being generally found in woods.

Thyatira Derasa (the Buff Arches, No. 12) is almost as beautiful as the preceding species ; the exquisite zigzag markings of delicate buff on the fore wings, from which it takes its characteristic name, being of almost unique character in British insects of this class. The Caterpillar (No. 13) feeds on the Bramble, and the Moth appears in June and July. Though once deemed far from common, the activity of recent collectors has shown it to be tolerably plentiful in many parts of the country, especially at Lyndhurst ; while it is found each season in many other places.


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PLATE XXIII.

No. 1.—The Feathered Ranunculus (*Eumichtis Lichenea*).
No. 2.—The Scarce Marvel of Peru (*Dipthera Orion*).
No. 3.—The Caterpillar of the Scarce Marvel of Peru.
No. 4.—The Dark Dagger (*Triæna Tridens*).
No. 5.—The Caterpillar of the Dark Dagger.
No. 6.—The Alder (*Acronycta Alni*).
No. 7.—The Caterpillar of the Alder.
No. 8.—The Knot-Grass (*Acronycta Rumicis*).
No. 9.—The Caterpillar of the Knot-Grass.
No. 10.—The Sycamore (*Apatela Aceris*).
No. 11.—The Caterpillar of the Sycamore.
No. 12.—The Miller (*Apatela Leporina*).
No. 13.—The Caterpillar of the Miller.

The genus *Eumichtis** contains but one British species, which has been separated from the *Poliæ*, with which it was formerly grouped, on account of its pectinated antennæ, and some other less marked characters. Some English entomologists place the solitary species, *E. Lichenea*, in Duponchel's genus, *Epunda*, along with three other British species.

Eumichtis Lichenea (the Feathered Ranunculus, No. 1) is, in most localities, a rare insect, but has been taken at Birkenhead in some numbers, and has been captured also, though sparingly, at Bristol and Plymouth. The Caterpillar, according to Brockholes, as cited by Mr. Stainton, is dark green, inclining to olive, with three rows of dusky black markings along the back, and the spiracular line green. It is said to feed on Ragwort, and several other plants.

The seventh Sub-Family of *Noctuidæ*, *Bombycoidi*, contains four genera, *Dipthera*, *Triæna*, *Acronycta*, and *Apatela*.

The genus *Dipthera* is distinguished by the velvety antennæ of the males, those of the female being simple, and by the long and rather slender palpi. The abdomen is slender, and tufted on the first segment; and the fore wings are broad and beautifully marked. It is also distinguished by the hairy Caterpillars, which resemble those of the *Arctiidæ*. They do not burrow to undergo their transformation. There is only one British species.

Dipthera Orion (the Scarce Marvel of Peru, No. 2) is still a rare species, though found in many widely distant localities. The Caterpillar (No. 3) feeds in autumn upon the foliage of the Oak, Birch, etc., and the perfect insect appears in the following May and June.

The genus *Triæna*, of Hübner, contains two British species, the well known Dagger Moths, which have been separated from the genus *Acronycta*, to which they formerly belonged in our arrangements, on account of the remarkable elevation on the fourth segment from the head in the Caterpillar, and the distinct dagger-like markings of the fore wings in the perfect insect. For these reasons they were also placed in a separate genus by Guénée, which he termed *Semaphora*. The antennæ are simple in both sexes, and the abdomen is not crested. The pupa is formed among moss, or in the crevices of bark.

Triæna Tridens (the Dark Dagger, No. 4) is the rarest of the two species, though both are common. The Caterpillar (No. 5) feeds on Sloe, Whitethorn, etc., in the autumn, and the perfect insect appears in the following May and June. The short black marks near the base of the anterior wings have somewhat the shape of a trident, from which it takes its popular name. It has also the marks like the Greek *Psi* nearer the edge of the fore wings.

Triæna Psi (the Gray Dagger) is paler than the preceding. It receives its name from several marks near the

* The genus *Eumichtis*, in the system I am adopting, ought to have followed the genus *Polia*, but I have found it more convenient to describe it here.

edge of the fore wings, in the form of the Greek letter *Psi*. In the Caterpillar stage it may be distinguished from *T. Tridens* by a much lower hump, surrounded by a clear cream-coloured blotch, and by other distinctive markings.

The genus *Acronycta*, as now restricted, still contains nine species, some of which, from their distinctness, especially in the preparatory stages, may, at no distant period, form the basis of separate genera. The chief characteristics of this genus, as now accepted, are—long and slender antennæ, simple in both sexes, the palpi rising to the level of the eyes ; and the abdomen is not crested, except in *Ligustri*. The larvæ are excessively various, but the pupæ are in no instance formed in the earth, the transformation taking place in crevices of bark, or among moss.

Acronycta Alni (the Alder, No. 6) is one of the most beautiful, and perhaps the rarest of the genus. The Caterpillar (No. 7) feeds on various trees, but prefers the Alder. The Moth appears in June. Halton, in Buckinghamshire, Huddersfield, and many other places of its capture are recorded. The singular clubbed hairs which issue from each segment of the Caterpillar, will, no doubt, when we are better acquainted with the larvæ of allied exotic species, cause *A. Alni* to take its place in a new genus.

A. Rumicis (the Knot-Grass, No. 8) is the other species which I have selected to illustrate this genus. It is as common as *A. Alni* is rare. The Caterpillar (No. 9) feeds upon Dock, Bramble, and other plants, in the autumn ; and the Moth, which is common everywhere, appears in the following May.

The other species are, *Acronycta Ligustri* (the Coronet), the fore wings of which are of a greenish brown, the usual markings being varied with whitish portions, especially a large blotch near the apex ; and the hind wings deep clear brown. *A. Strigosa* (the Marsh Dagger) is a very rare species, formerly represented by the unique specimen in the Haworth collection, "supposed" to have been taken in Norfolk; but a better authenticated capture at Cambridge now fully entitles the species to a place in the British catalogue. The fore wings are pale gray, shaded with black towards the inner margin; the extreme base of the inner margin is fulvous, the renal stigma is pale ochreous ; the hind wings are ashey gray. *A. Auricoma* (the Scarce Dagger) resembles in general appearance the *Triænæ ;* the external striga, or band, is traversed near the posterior angle by a sharp black streak pointing inward, forming somewhat the shape of a Greek *Psi*, but much heavier and blacker than the similar forms in the *Triænæ*. *A. Menyanthidis* (the Light Knot-Grass) has the fore wings pale gray, with the usual general markings, and a blackish hook-like mark near the base; the hind wings being brown, with pale fringes. The Moth is rather rare, and generally found in the northern counties. *A. Salicis* (the Willow) was at one time thought to be merely a variety of *A. Menyanthidis*, but is now generally admitted to be distinct. It is distinguished from the last-named species by the more strongly marked brown strigæ, which form themselves into broad patches. It also closely resembles *A. Rumicis*, but is invariably darker. *A. Myricæ* is a newly-discovered species, now found plentifully at Rannoch, in Scotland. The front wings are pale gray, varied with dark gray and black, without any conspicuous paler markings. The hind wings are white, with the veins brownish. The last species is *A. Megacephala* (the Poplar Gray) ; it resembles in general appearance *A. Rumicis*, but is larger, and the tone of colouring of the fore wings grayer, and the markings less distinct. The Caterpillar has more the proportions and markings of those of the *Geometræ* than of those of the present family ; and the head being of larger diameter, has suggested the specific name, *Megacephala*, or Great-headed.

The genus *Apatela* contains two British species, which are placed by some writers in the genus *Acronycta*, but the distinct character of the hairy Caterpillars, much resembling those popularly known as the *Tussocks*, seem fully to warrant the formation of the species so distinguished into a distinct genus. *A. Leporina* has, in fact, so many affinities in both the preparatory and perfect stages to several of the *Arctiidæ* that, but for the simple antennæ of both sexes, it would seem more in its place in that family.

A. Aceris (the Sycamore, No. 10) is a common insect. Varieties occur in which the pale fore wings, like those of the specimen figured, are of a very deep brownish gray, but with the same markings. The handsome Caterpillar (No. 11) feeds on Horse Chestnut, Sycamore, etc. The perfect insect appears about the end of June.

A. Leporina (the Miller, No. 12) is much more rare, but localities are now known in which it is tolerably common, as at Lyndhurst, York, and Worthing ; and other places are named where it is far from scarce. The Caterpillar (No. 13) feeds on Willow, Elm, Birch, etc. The Moth appearing in May and August.


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PLATE XXIV.

No. 1.—The Marbled Beauty (*Bryophila Perla*).
No. 2.—The Satin Carpet (*Ceratopacha Fluctuosa*).
No. 3.—The Yellow-Horned (*Ceratopacha Flavicornis*).
No. 4.—The Caterpillar of the Yellow-Horned.
No. 5.—The Minor Shoulder-Knot (*Cleoceris Viminalis*).
No. 6.—The Heart Moth (*Engramma Oo*).
No. 7.—The Double Kidney (*Ipimorpha Retusa*).
No. 8.—The Caterpillar of the Double Kidney.
No. 9.—The White-Spotted Pinion (*Cosmia Diffinis*).
No. 10.—The Caterpillar of the White-Spotted Pinion.
No. 11.—The Dun-bar (*Euperia Trapetzina*).

The eighth Sub-Family of the *Noctuidæ*, the *Bryophagidi*, comprises only one British genus, *Bryophila*. The genus *Bryophila* is well distinguished from other genera of *Noctuidæ* by the smaller and more delicate forms of the species which it includes, only two of which are British; these have slender and simple antennæ in both sexes, the palpi are raised upwards, the abdomen is slight, and crested above, and the wings are rather broad. The Caterpillars are slender, and more or less covered with pilose tubercles. They feed on various Lichens.

Bryophila Perla (the Marbled Beauty, No. 1) is the smallest of the two species. It is extremely variable, both in the distinctness of the markings and the intensity of the ground colour of the wings. The hind wings are, however, generally pale. The Caterpillar feeds on Lichens growing on trees or walls, and the Moth may be found in July and August settled upon old walls or palings. It is a very common species.

Bryophila Glandifera (the Marbled Green), the other species, is generally rather larger than *Perla*, and may also be distinguished by the full brown tone of the hind wings; it is, however, very variable. The Caterpillar, which is greenish, with dark and white stripes, is also a Lichen feeder. The perfect insect appears rather earlier than *Perla*, being often found in June, but also in July and the beginning of August. It is common, but does not appear to be quite so abundant as the preceding species.

The ninth Sub-Family are the *Noctuo-Bombicidi*, of which there are three genera, *Ceratopacha*, *Cleoceris*, and *Engramma*.

The genus *Ceratopacha*. In this genus the insects are distinguished by the form of the fore wings, which are either obtuse or angulated; the antennæ are thick and short, but simple in both sexes, though pubescent beneath; the palpi are horizontal, with the last joint long and slender; the abdomen somewhat slender, and not crested. The typical larvæ are rather large-headed, smooth, and rather flattened beneath. They feed on various trees, between leaves webbed together. There are seven British species.

Ceratopacha Fluctuosa (the Satin Carpet, No. 2) is not a common insect, but is not unfrequently taken in woody districts of the southern counties, and has also been taken in the lake district, at Huddersfield, Tenterden and Worcester. The Caterpillar is yellowish white, with a dark head, and feeds on Birch. The Moth appears about the end of June.

Ceratopacha Flavicornis (the Yellow-Horned, No. 3) was formerly considered a rare species, though taken occasionally in the woods round London. It has, however, recently been taken abundantly near Manchester, and in some plenty at Brighton and Bristol. The Caterpillar (No. 4) feeds on Birch, rolling up the leaves. The perfect insect appears in March and Apri .

The other species are—*C. Dupiaris* (the Lesser Satin Carpet), a pretty little species, the fore wings of which are pale gray, with numerous darker waved bands. The hind wings are very pale brown, with a light band across the middle. *C. Diluta* (the Lesser Lutestring), a pale toned species, with two groups of bands across the fore wings, and other marks. *C. Or* (the Poplar Lutestring), a larger and darker coloured species, the ground being dark gray, and the bands and markings dull brown. *C. Ocularis* (the Figure of Eighty), at once distinguished by the marks, or stigmata, in the centre of the fore wings, which are white, filled up with black, and resembling the numerals 80. And, lastly, *C. Ridens* (the Frosted Green), which is a very distinct species; the ground colour of the fore wings

being pale buff, closely marked and variegated with dull olive ; and these markings vary so much that it sometimes appears entirely olive ; the hind wings are brownish olive at the external edge, but become white half way towards the base. The Caterpillars of all the species are leaf-rollers.

The genus *Cleoceris* contains but one British species. Its distinctive characters are—antennæ bipectinated in the males, and serrated in the females ; the thorax not crested ; the larvæ attenuated, smooth, and living in a case of leaves webbed together.

Cleoceris Viminalis (the Minor Shoulder-Knot, No. 5) is a very variable species, some having the fore wings much darker than our specimen, while others are suffused with a bright purplish tone. The Caterpillar is green, with pale longitudinal streaks ; it feeds on the Willow, and the Moth appears in June and July, but is not common.

The genus *Engramma* contains only one species, recently separated from *Cleoceris*, on account of several anatomical distinctions, too minute for detail in a work of popular character. The chief distinctions of the genus are—the antennæ pubescent, and the abdomen rather depressed in the male, and pointed in the female ; the larvæ slightly flattened, and living in leaves webbed together.

Engramma Oo (the Heart Moth, No. 6) is a remarkably pretty insect. The Caterpillar feeds upon Oak, and is reddish brown, marked with oval spots and white lines. It is rather an uncommon species, though widely dispersed.

The tenth Sub-Family of the *Noctuidæ*, the *Xanthidi*, contains eight genera, *Ipimorpha*, *Cosmia*, *Euperia*, *Xanthia*, *Jodia*, *Orbona*, *Atethmia*, and *Scoliopteryx*.

In the genus *Ipimorpha* the antennæ are simple, the thorax slightly crested, and the abdomen somewhat flattened, and fringed at the sides ; the tips of the anterior wings are rather falcate or hooked, and their lines and spots distinct. The larvæ are flattened beneath, smooth, and somewhat shining, feeding between webbed leaves. There are two species.

Ipimorpha Retusa (the Double Kidney, No. 7) is a species formerly considered rare, but now found in several localities, though sparingly, as at Wavendon, Worcester, and York.

I. Subtusa (the Olive), the other species, has the fore wings olive-green, the lines and margin yellowish, the stigma filled with gray. It was formerly considered rare, but has recently been found in some plenty at Halton in Buckinghamshire, at Manchester, and somewhat less commonly in several other recorded localities.

The genus *Cosmia*. In this genus the antennæ are simple or slightly pubescent ; the abdomen slender and conical, and the edge of the fore wings denticulated. The Caterpillar is smooth, slightly flattened beneath, and attenuated anteriorly. It feeds enveloped in webbed leaves, among which it generally undergoes its transformation. The pupa is very pointed at the hind part. There are three species.

Cosmia Diffinis (the White-Spotted Pinion, No. 9) is strikingly distinguished by the two white patches, at the front edge of the fore wings, in which the transverse bands terminate. The Caterpillar (No. 10) feeds on the Elm, the Moth being found in August. It is a common and widely-dispersed species.

The other species are, *C. Pyralina* (the Lunar-Spotted Pinion), having the fore wings reddish brown, distinguished by grayish indistinct patches near the front angles ; and *C. Affinis* (the Lesser-Spotted Pinion), resembling *C. Diffinis*, but smaller. The transverse bands in this species are grayish instead of ochreous, and terminating in gray patches in front instead of white. Varieties occur which were formerly deemed distinct species, while other distinct species have been removed from the genus.

The genus *Euperia* consists of two species, first detached from *Cosmia* by M. Guénée, considering them, as Mr. Westwood states, far removed in the system from the other species. M. Guénée places several of the *Cosmiæ* in his new genus ; but in the system I am following, only two are admitted, and some entomologists only admit one, *Fulvago*, as being the only one exhibiting the main distinctive character, that of the Caterpillar feeding exposed, and not webbed up in leaves.

Euperia Trapetzina (the Dun-bar, No. 11) is a delicately marked insect. The Caterpillar is light transparent green, but sometimes dusky in colour, with a light yellow line on each side. It feeds on Oak. The Chrysalis is formed among the spun-up leaves in June ; it is red, covered with a fine bloom. The Moth appears in July, and is a very abundant species. The other species, *E. Fulvago*, very closely resembles it, but is rather larger, and much yellower in tone. This pretty insect is extremely rare.


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PLATE XXV.

No. 1.—The Pink-barred Sallow (*Xanthia Flavago*).
No. 2.—The Caterpillar of the Pink-barred Sallow.
No. 3.—The Orange Upperwing (*Jodia Croceago*).
No. 4.—The Caterpillar of the Orange Upperwing.
No. 5.—The Flounced Rustic (*Orbona Rufina*).
No. 6.—The Caterpillar of the Flounced Rustic.
No. 7.—The Centre-barred Sallow (*Atethmia Centrago*).
No. 8.—The Herald (*Scoleoptcryx Libatrix*).
No. 9.—The Caterpillar of the Herald.
No. 10.—The Frosted Orange (*Gortyna Flavago*).
No. 11.—The Caterpillar of the Frosted Orange.
No. 12.—The Butter-burr (*Gortyna Petasites*).
No. 13.—The Double Line (*Mythimna Turca*).
No. 14.—The Caterpillar of the Double Line.
No. 15.—The Trebble Lines (*Meristis Quercus*).
No. 16.—The Mottled Rustic (*Caradrina Morpheus*).
No. 17.—The Caterpillar of the Mottled Rustic.
No. 18.—The Reddish Buff (*Acosmetia Caliginosa*).
No. 19 —The Anomalous (*Stilbia Anomala*).

The genus *Xanthia*, the type of the *Xanthidi*, is distinguished by the slight ciliation of the antennæ of the males on the under side, by the obliquely-projecting palpi, and by the slightness and somewhat flattened form of the abdomen; also by the angulated and slightly hooked form of the anterior angles of the fore wings. The wings are generally of brightish yellow or ferruginous tone, and slope downwards on either side, like a steep roof, when at rest. The Caterpillars are short, rather thick, attenuated at the head, and having a horny plate on the first segment. They feed on the buds and catkins of trees, when young, but afterwards are said to prefer low-growing plants. There are five species.

Xanthia Flavago (the Pink-barred Sallow, No. 1) exhibits in a marked degree the yellow-toned wings which distinguish most of the species; the bars and marks, as indicated in the popular name, being of a rich pinkish tone. The Caterpillar (No. 2) feeds on the Lime and Sallow in the spring, and has been found also on Plantain, probably when in a more advanced stage, as characteristic of the habits of the larvæ of nearly the entire genus. The Moth does not appear till September and October. It is not rare, being found in most of the woods round London, often fluttering over Ivy blossoms. It is also found in the north, as far as Birkenhead, and even Edinburgh; many intermediate localities are also recorded as places where it is tolerably common.

The other species are all distinguished by names having reference to the yellow, orange, or ferruginous tone of their general colouring—namely, *X. Cerago* (the Sallow), *X. Gilvago* (the Dusky-lemon Sallow), *X. Acerago* (the Barred Sallow), *X. Citrago* (the Orange Sallow).

The genus *Jodia*, in British collections, contains at present but one species, formerly grouped with the *Xanthiæ*. Having been deemed sufficiently distinct to form the type of a separate genus, Mr. H. Stephens, in detaching the species in question, called the new genus *Xantholeuca;* but the name *Jodia*, dating as early as 1816, has since been preferred. This genus is mainly distinguished by the elongated palpi, having the appearance of a beak; the abdomen is much flattened, and the fore wings are acute at the tip. The larva is not attenuated towards the head, and has a slight hump on the twelfth segment. The pupa is subterranean.

Jodia Croceago (the Orange Upperwing, No. 3) is a variable insect in colour, some specimens being much paler, and others darker, with more distinct markings, than the one in my figure. The Caterpillar (No. 4) feeds on Oak. The Moth appears in autumn, and sometimes survives the winter. It is considered rather rare, but has been

recently captured at Lewes, Lyndhurst, Tenterden, and Worcester; and may generally be sought with success in Oak woods in the more southern counties.

The genus *Orbona* may be said to be formed, like *Jodia*, of aberrant species of *Xanthia*; *O. Ferruginea* being still preserved in the genus *Xanthia* by some English entomologists. The insects assigned to the genus *Orbona* differ from the *Xanthiæ* by the acuteness and other details of the fore wings, and by having the thorax scarcely crested, and by the greater length of the abdomen. There are two species.

Orbona Rufina (The Flounced Rustic, No. 5) is not a rare insect. The Caterpillar (No. 6), which is reddish, spotted with white, with white lines, feeds on the Oak; and the Moth is found late in the autumn. It is tolerably plentiful in many of the woods in the metropolitan counties, and in many other localities.

The other species, *O. Ferruginea* (the Brick), is somewhat larger, and the marking of the wings more distinct. It is a much more rare species, but occurs in Combe Wood, New Forest, and in other favourite localities of our collectors, at the same season as *O. Rufina*, namely, September and October.

The genus *Atethmia* is, like *Jodia* and *Orbona*, founded upon the distinct character of a species formerly classed with the *Xanthiæ*. It has been separated more especially on account of the different form of the dentation of the wings, the structure of the palpi, the unflattened abdomen, and the very distinct character of the markings. M. Guenée founded a genus for this insect, which he named *Cirrœdia*; but a previous name of Hübner's has been now adopted.

Atethmia Centrago (the Centre-barred Sallow, No. 7) is extremely rare. The Caterpillar is rather short, with grayish-brown marbled markings; it feeds on the Oak, and also on low plants. It has been taken at Bristol, Cambridge, Scarborough, Worcester, York, and other places.

Scoleopteryx is a well-marked genus, at once distinguished from all other *Noctuidæ* by the varied form of the fringed margin of the anterior wings. The Caterpillar is slender, and attenuated towards the head.

Scoleopteryx Libatrix (the Herald, No. 8) is one of our prettiest and commonest Moths. The Caterpillar (No. 9) feeds on Willows, Poplars, and other trees. There are two broods, the April Caterpillar producing the perfect insect in June, and the June larvæ attaining their perfect state in September. Many specimens live through the winter, and are often found sheltering in out-houses and other convenient situations.

The eleventh sub-family, the *Gortynidi*, contains but one British genus.

The genus *Gortyna* is distinguished by the setaceous antennæ of the male, and by the short palpi; also by the length and smoothness of the abdomen, which is very large in the female. The thorax is slightly crested, and the wings form a triangle when in repose. The larvæ are dull coloured, naked, and grub-like, feeding in the interior of the stems of plants, in which they undergo their change to the pupa state. There are three species.

Gortyna Flavago (the Frosted Orange, No. 10) is a common species. The Caterpillar (No. 11), which is of a dull flesh-colour, or yellow spotted with black, feeds within the stems of various aquatic and marsh plants; and the Moth appears in August and September. It is found where there is marsh or standing water. It is easily attracted and taken by the exposure of a light at night.

Gortyna Petasites (the Butter-burr, No. 12) is a newly-discovered species, differing, as will be seen, very materially, both in size and form, from *G. Flavago*. The Caterpillar is dull white, with black spots, the head, and plate on the anal segment brown. It has been taken in great plenty at Manchester, and one or two other localities are named where specimens have been captured, especially near streams, where the Butter-burr abounds, as the Caterpillar feeds in the stems of the plant. By some authors this species is placed in the genus *Hydræcea*.

The other species is *G. Micacea* (the Rosy Rustic). It is less than the preceding, the front wings pale rosy brown, the hind wings pale grayish. It is very abundant in many places, especially at Birkenhead, Brighton, Bristol, Burton-on-Trent, etc.

The twelfth sub-family of *Noctuidæ* is that of the *Caradrinidi*, consisting of five genera, *Mythimna*, *Meristis*, *Caradrina*, *Acosmetia*, and *Stilbia*.

The genus *Mythimna* is formed of insects previously included in the genus *Leucania*, from which they are now separated in the system I am following, and by several modern entomologists, on account of the elongated body, the

form of the anterior wings with their partially obliterated stigmas, and the pubescent eyes; also, on account of some differences in the Caterpillar state, which appear to warrant the separation. Three British species are assigned to this genus.

Mythimna Turca (the Double Line, No. 13) is a large and robust insect, the more compact forms of which seem at once to present to the ordinary observer a character different from that of the typical *Leucaniæ*. The Caterpillar (No. 14) is said to feed upon several kinds of reeds, but more especially the *Juncus Pilosus;* others describe it as feeding on grasses in woods; and the Moth is, in fact, found in such situations in the month of July. It is a rare and very local species, but has occurred in Essex, at Combe Wood, and at Bristol, and more recently at Lewes and Lyndhurst in some plenty, and more sparingly at Manchester.

The other species are:—*M. Conigera* (the Brown-line Bright Eye), which is considerably smaller, and rather less robust in general appearance, and having the markings more distinct, and the stigma pale ochreous instead of white. *M. Lythargyria* (the Clay), though very closely resembling the last, is rather smaller than either of the preceding species. It has a pervading gray tinge, and a little white in the renal stigma. This last is now considered common, though a few years since deemed a rarity. Varieties of this species occur, which were formerly placed in collections under the name of *M. Grisea.* Another insect was also included in this genus, under the name of *M. Imbecilla*, which is now omitted in all recent catalogues.

The genus *Meristis* consists of two species, separated some time since from *Caradrina*, and placed in M. Guénée's genus, *Grammesia,* for which the older name of Hübner, *Meristis,* has since been substituted. The obtuse anterior wings and woolly thorax separate them sufficiently from the preceding genus *Mythimna*, while in the preparatory stages they are still more distinct, the Caterpillar being, according to M. Guénée, very short, and almost onisciform.

Meristis Quercus (the Treble-lines, No. 15) is one of our most abundant species in the Moth state, though the Caterpillar is unknown to most British collectors.

The other species, *M. Bilinea* (the Dark Treble-lines), by some retained in the genus *Caradrina*, is much darker and rather smaller than the preceding, and is without the fourth line, the three others being much less distinct. It is much more rare than the other species, though found in many localities, especially in the more southern counties.

The genus *Caradrina*, in its restricted form, contains five tolerably homogeneous species. The insects assigned to it are distinguished by antennæ rather short and simple, and the abdomen less robust than in the genus *Meristis;* the fore wings are thick and silky, the larva short and attenuated at each end, the head very small. They only feed by night, and undergo their transformation in the earth.

Caradrina Morpheus (the Mottled Rustic, No. 16) is a very common species. The Caterpillar (No. 17) feeds on the Bindweed, or Wild Convolvulus, and the Moth appears in June.

The other species are:—*C. Blanda* (the Rustic), about the size of the preceding, but having broad dark bands running across the anterior wings. *C. Alsines* (the White-line Rustic), the fore wings of which are pale brown, with darker stigmas bordered with an ochreous line; the hind wings are pale, with a dark border. *C. Cubicularis* (the Pale Mottled Willow), much resembling the first species, is distinguished by the pearly whiteness of the hind wings. Lastly, *C. Exigua* (the Small Mottled Willow), possibly a small variety of *C. Cubicularis.*

The genus *Acosmetia* is now restricted to three species only, two of which are extremely rare. It is characterized by the short but slender antennæ, pubescent in the males; by the long and slender body, and by the fore wings, which have a more or less silky appearance. The larva of one of the species is thick, and attenuated at each end, and the pupa is formed in the earth.

Acosmetia Caliginosa (the Reddish Buff, No. 18) is very rare. The New Forest is the only locality cited for its capture. It flies at dusk, or during the day in very moist and shady places. The Caterpillar is unknown.

Acosmetia Palustris (the Marsh Buff) is still more rare than the preceding, the only known British specimen having been taken at Compton's Wood, near York. In some systems it is placed in another genus (*Hydrilla*), the female being very different in form from the male, having the fore wings narrower, and being generally much smaller. This species is also distinguished from the preceding by the apparent hairiness of the wings in both sexes, which prevents them from having the silky appearance of those of a *Caliginosa.* It is about one inch to

one inch two lines across the expanded wings; the front wings are dull brownish, with the renal stigma blackish, and some of the nervures darker brown; the hind wings are pale grayish brown, with a darker mark in the centre.

The third species, *A. Arcuosa*, resembles *A. Caliginosa*, but is rather smaller, and has the fore wings paler and the markings less distinct, while the hind wings have a much darker border. The Moth is not very uncommon in woods near London, but the larva is unknown to our collectors.

The genus *Stilbia* is distinguished by the character of the wings, which fold round the body like those of the *Lithosiæ*, and are very shining. They have very distinct markings in the males, while those of the females are darker, and without either band or stigma, or, having them but very indistinctly. There is but one species.

Stilbia Anomala (the Anomalous, No. 19) is taken in many localities, even as far north as Scotland, but is considered rather rare. The larva is green or reddish gray, with pale and slender lines of a yellowish tone, and a broad spiracular line of white. It feeds on grasses. This genus is by some formed into a distinct family (*Stilbidæ*), as presenting characters which render its location with any other group very anomalous.


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PLATE XXVI.

No. 1.—The Silky Wainscot (*Senta Ulvæ*).

No. 2.—The Flame Wainscot (*Senta Flammea*).

No. 3.—The Small Rufus (*Cœnobia Rufa*).

No. 4.—The Bullrush (*Nonagria Typhæ*).

No. 5.—The Female of the Bullrush.

No. 6.—The Caterpillar of the Bullrush.

No. 7.—The Tipped Wainscot (*Nonagria Extrema*).

No. 8.—The Twin-spotted Wainscot (*Nonagria Gemini Puncta*).

No. 9.—The Caterpillar of the Twin-spotted Wainscot.

No. 10.—The Striped Wainscot (*Leucania Pudorina*).

No. 11.—The Caterpillar of the Striped Wainscot.

No. 12.—The *New Leucania* (*Leucania Vitellina*).

The thirteenth sub-family of *Noctuidæ* is that of the *Nonagridi*, containing four closely related genera, *Senta*, *Cœnobia*, *Nonagria*, and *Leucania*.

The genus *Senta* is characterized by the pubescent antennæ of the males, and the very long and slender abdomen, which is without crests. The anterior wings are rather narrow, and have the raised nervures of a lighter colour than that of the ground, which produces somewhat the appearance of regularly grained Oak, from which the popular name of this group, the *Wainscots*, is derived. They are at once distinguished from the following genus, *Nonagria*, by their much smaller size and by the slenderness of the body. The stigmas are traceable, but nearly obsolete. The larvæ are smooth, and but faintly coloured, like all those that feed in the interior of the stems of plants.

Senta Ulvæ (the Silky Wainscot, No. 1) is found in the fens of Cambridgeshire, and has also been taken among the reeds on the banks of the Thames, at Hammersmith; but it is rare. The Caterpillar, as described by Treitschke, is of a yellowish ochreous tone, with delicate stripes, and feeds in the stem of the reed *Arundo Phragmites*.

Senta Flammea (the Flame Wainscot, No. 2), the only other species, is by some placed in another genus (*Meliana*); but in the system I am following it is grouped very naturally with *S. Ulvæ*, though the still greater length and slenderness of the body, and the longer and more almond-shaped wings, may probably justify its separation. It is more scarce than the preceding species, not having at present been found in any other locality than the Cambridgeshire fens. The Caterpillar is unknown.

The genus *Cœnobia* contains but a single species, separated from *Acosmetia* on account of several minute structural distinctions ; it is placed by some in the genus *Nonagria*, with which it has considerable affinity; but in the system I am following it is made to form a distinct genus, in accordance with a MS. arrangement of Stephens. The wings are broader and shorter than in *Senta*, and the body, which is more robust than in that genus, is yet elongated and thicker than in the insects assigned to the genus *Nonagria*.

Cœnobia Rufa (the Small Rufous, No. 3) is very rare, but has been taken near Whittlesea Mere, in Cambridgeshire, and in Norfolk. The Caterpillar is at present unknown.

The genus *Nonagria*, in which are placed some of the finest of our marsh Moths belonging to the "Wainscot" group, contains, as at present constituted, insects very closely allied to several of those placed in the following genus (*Leucania*), which, however, now forms part of a distinct sub-family, while several of the species ranged as *Leucaniæ* are far too distinct to group homogeneously together, so that we may look for a remodelling of these genera at no distant period. The larvæ of the *Leucaniæ* form a very distinct and well-marked group as not feeding on the pith of plants like those of *Nonagridi*.

The genus *Nonagria*, as at present constituted, is said to be characterized by the strongly ciliated antennæ of the male insects, and the slight pubescence of those of the females. The palpi are pointed upwards, the body is both

robust and elongated, and thicker in the female. This however scarcely applies to that section of the genus containing the smaller species. The larvæ are smooth and pale coloured, with lighter and darker stripes. They feed in the interior of the stems of reeds and aquatic grasses.

Nonagria Typhæ (the Bullrush, No. 4) is one of the species belonging to the large and robust insects of this group ; the female (No. 5) being one of the largest Moths in the whole family of *Noctuidæ*. The Caterpillar (No. 6), though represented creeping upon a reed, feeds, like those of all the genus, on the pith of the interior of the flower-stems. This Moth is not uncommon wherever the Bullrush is plentiful, and appears from July to September. The pupa is formed inside the stem, close to an aperture eaten by the Caterpillar, and partially closed again with web and gnawed portions of the stem. This insect varies considerably in colour, so that when they were first captured in some plenty by Mr. S. Stevens, a few years ago, many of the varieties were thought to be distinct species.

N. Cannæ and *N. Crassicornis* are the two other large and robust species. They are principally distinguished from *N. Typhæ* by their general colour, *N. Cannæ* being constantly of a reddish tone, and *N. Crassicornis* intermediate in tone between the red buff of *N. Cannæ* and the grayish ochre of *N. Typhæ*. *N. Cannæ* has only been taken at Yaxley, but *Crassicornis* is said to have occurred in several marshy localities in some plenty.

Nonagria Extrema (the Tipped Wainscot, No. 7) belongs to the smaller set of insects in this genus. It is very rare, only taken sparingly in the fens of Cambridgeshire. The Caterpillar is unknown.

N. Gemini Puncta (the Twin-spotted Wainscot, No. 8) holds an intermediate place between the small and large insects of the group. The Caterpillar (No. 9) feeds in the stems of *Arundo Phragmites*, and the Moth appears from July or August to September. It has been taken in the Hackney marshes, at Hammersmith, and in Cambridgeshire.

The other small species of *Nonagria* are—*N. Fulva* (the Small Wainscot), which is reddish ochreous, dotted with gray, and is the commonest of the small species; *N. Helmanni* (the Mere Wainscot), reddish ochreous, dusted with darker, taken at Cambridge ; and *N. Neurica* (the Brown-veined Wainscot), reddish ochreous, streaked with a deeper colour, which has occurred at Yaxley.

The fourteenth sub-family of *Noctuidæ* is formed of the *Leucanidi*, distinguished from the *Nonagridi* by the habit of such of the Caterpillars as are known, which invariably feed on the *exterior*, and not, as the *Nonagridi*, on the *pith* of the stems. This sub-family contains four genera, *Leucania*, *Calamia*, *Simyra*, and *Oria*.

The genus *Leucania* is made to contain a group of insects to which it would be difficult to assign such characters as would distinguish them satisfactorily from those of the genus *Nonagria*, with the exception of a few aberrant species, which will doubtless be differently located when the group is better understood. The only good distinction is that of the larva stage before referred to, the habits of the larvæ, which are external feeders, having been the ground upon which this section of the "Wainscots" has been formed into a distinct sub-family. Some entomologists, however, keep them all together, as a well-marked and tolerably homogeneous group, under the title of the *Leucanidæ*.

Leucania Pudorina (the Striped Wainscot, No. 10) has been taken at Brighton, near Cambridge in great plenty, and also at Scarborough, York, and other places. The Caterpillar (No. 11) feeds on marsh grasses or reeds.

Leucania Vitellina (the New *Leucania*, No. 12), recently captured by Mr. Bouchard, is very distinct from most of the genus, as grouped in the system I am following, having the characteristic markings of the wings peculiar to very distinct genera, while, in most of the other *Leucaniæ*, they are either obsolete or entirely absent. I believe the specimen in the British Museum, from which my drawing is taken, is at present unique.

The other species of *Leucania* are—*L. Impura* (the Smoky Wainscot), *L. Comma* (the Shoulder Striped Wainscot), *L. Litteralis* (the Shore Wainscot), *L. Obsoleta* (the Obscure Wainscot), *L. Straminea* (the Southern Wainscot) and *L. Pallens* (the Common Wainscot). They nearly all bear a strong family likeness to each other, varying in colour from very pale ochre to a rather full brownish tone, the hind wings of some being nearly white. They are all rather smaller than *L. Pudorina*.


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PLATE XXVII.

No. 1.—The Fen Wainscot (*Calamia Phragmitidis*).
No. 2.—The Powdered Wainscot (*Simyra Venosa*).
No. 3.—The Tawny-veined Wainscot (*Oria Musculosa*).
No. 4.—The Angle-shades (*Phlogophora Meticulosa*).
No. 5.—The Caterpillar of the Angle-shades.
No. 6.—The Great Angle-shades (*Phlogophora Empyrea*).
No. 7.—The Mullein (*Cucullia Verbasci*).
No. 8.—The Caterpillar of the Mullein.
No. 9.—The Shark (*Cucullia Umbratica*).
No. 10.—The Caterpillar of the Shark.

The first insects in this Plate complete the group of the Wainscots.

The genus *Calamia* only includes one British species, recently separated from *Leucania*, on account of the Caterpillar being a pith feeder, and from *Nonagria*, on account of the glossy smoothness of the wings, the veins of which are not raised as in that genus.

Calamia Phragmitidis (the Fen Wainscot, No. 1) has the anterior wings rather bluntly lanceolate; they are shining and without marks, being of an ochreous colour, with a greenish-brown gloss. The Caterpillar is described by Treitschke as being of a dirty white, with a row of irregular spots of violet-brown. It has been taken in Cambridgeshire, and also in the Greenwich marshes.

The genus *Simyra*. This genus is characterized by the antennæ of the perfect insect, which are simple in both sexes, those of the male being, however, pubescent beneath. The fore wings are very pointed, and are without any of the usual characteristic marks, but have some dark longitudinal lines. In the Caterpillar stage, the insects assigned to this genus are very distinct from the other Wainscots, as they are clothed with fascicles of hair, and feed on herbaceous plants, the pupæ being enclosed in a cocoon.

Simyra Venosa (the Powdered Wainscot, No. 2) is found in Huntingdonshire, and other marshy districts. The Caterpillar is thick, and clothed with fascicles of erect hairs, yellowish on the upper side of the body. It is spotted with red, brown, and black, and has a yellow lateral stripe, interrupted by brown dots.

The genus *Oria* contains another of the species, separated from *Leucania*. It is the same genus as Duponchel's *Synia*, Hübner's name having been eventually preferred on account of its priority.

Oria Musculosa (the Tawny-veined Wainscot, No. 3) is extremely rare, but two specimens have been taken recently at Brighton. The Caterpillar is unknown.

The fifteenth sub-family of the *Noctuidæ* is that of the *Cucullidi*, containing the group popularly known as the Sharks, and some other rather aberrant species, which have been located with them for want of a better place.

The genus *Phlogophora* is one of these, and it is made to comprise two British species, which have but small affinity with each other. There are common characteristics, however, which may be stated, as—Antennæ pubescent, abdomen long and hairy at the sides, fore wings dentate at the fringed edge; in *P. Meticulosa* the main form being also deeply waved. In repose, the wings fall on either side with a very steep incline, and in Continental species they are sometimes folded, giving the insect a very long and narrow appearance. The Caterpillars are velvety, with oblique streaks along the back. They feed on low plants, concealing themselves during the day. The pupa is formed in a subterranean cocoon according to some authors, while others state that it is placed on the surface of the ground.

Phlogophora Meticulosa (the Angle-shades, No. 4) is one of our prettiest, and at the same time most abundant, native species. The Caterpillar (No. 5) feeds on a great variety of common plants. There are two broods, the Moths appearing in May and September.

P. Empyrea (the Great Angle-shades, No. 6) is one of the most striking of the recent additions to the list of our native *Lepidoptera.* It appears to be a very local species, no specimens having yet occurred except at Lewes and Brighton, and there in particular spots only. When the new prize was first discovered, there was a great rush among the professional collectors, as the insect appeared in considerable numbers in the favoured localities, and specimens were selling at high prices. Some curious anecdotes are related in entomological circles relating to the devices of the rival hunters to outwit each other, and to the occasional ruptures of the usually peaceful understanding existing among naturalists, which in one or two instances amounted, as I am informed, to open war. All, however, eventually made good harvest, and corresponding profit ; and few cabinets are now without a specimen of this handsome insect. The Caterpillar, according to Dr. Boisduval, is grayish-green, or brown, with pale lines, and a row of dark lozenges along the back. It feeds on several low plants, appearing to prefer the Pilewort.

The genus *Cucullia* contains a numerous and well-defined series of species, forming a singularly homogeneous group of insects, all remarkable, both for their lance-like and elegant form, and their large size ; and also for the beauty of the Caterpillars, some of which are among the handsomest in the whole family of *Noctuidæ.* There are nine species, but two specimens will serve as sufficient types of the whole. The antennæ are smooth in both sexes ; the body extends far beyond the wings, which are narrow and lanceolate, the hind wings being peculiarly short. The Caterpillars are shining, and usually prefer the flowers of the plants on which they feed. The pupa is soft, and enlosed in a large subterranean cocoon.

Cucullia Verbasci (the Mullein, No. 7) is a very beautifully marked and elegantly formed insect. The Caterpillar (No. 8) feeds on different kinds of *Verbascum,* and is the only kind that prefers the leaves to the flowers ; it is found from May to August, and the Moth appears in the following May. It is common wherever the *Verbascum* abounds.

The species *C. Scrophulariæ* (the Water Betony), *C. Lychnitis* (the Striped Lychnis), *C. Asteris* (the Starwort), *C. Gnaphali* (the Shepherd's Purse), are all closely allied to *C. Verbasci,* partaking of all its peculiarities of form and marking, though with sufficient distinctions.

C. Absinthii (the Wormwood), and *C. Artemisiæ* (the Green Silver-spangle), are much more distinct, both from the preceding and following sections of the genus, having the wings less acute in form, while their markings are of a more mottled and less linear character. *C. Artemisia* (the Silver-spangle) is, however, very doubtful as a British species, the single specimen in the British Museum having been placed in that collection by Dr. Leach, without, as it would seem, sufficient evidence of its positive capture in England.

C. Umbratica (the Shark, No. 9) is the type of the third division of the genus. The gray and acutely formed wings, with their sharp longitudinal markings, have something so Shark-like in their general aspect, that the popular name of this section of *Cucullia* seems to be extremely appropriate. So indeed are most of the popular names of our native *Lepidoptera,* which do great credit to the observation of our unlearned collectors, who have coined such picturesque and highly descriptive titles for the most part without the aid of scientific acquirements of any kind. The Caterpillar of the Shark (No. 10), though handsome, is not so beautiful as that of *C. Verbasci,* and has, moreover, a sinister aspect that well accords with the appearance of the perfect Moth. It feeds on the Sow-thistle. The Moth appears in July, and is widely dispersed, and may be considered a common insect.

C. Chamomillæ (the Chamomile Shark) is the other species of this last section. It is not very rare, and is widely dispersed, being found as far north as Edinburgh.

C. Lactucæ (the Lettuce Shark), with its handsome larva, once in our catalogue of native insects, along with some other allied species, are no longer considered British ; and the beautiful Green Silver-spangle must, I fear, as stated above, be likewise permanently erased from our native list.


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PLATE XXVIII.

No. 1.—The Pease-blossom (*Periphanes Delphinii*).
No. 2.—The Caterpillar of the Pease-blossom.
No. 3.—The Flax Moth (*Calophasia Linariæ*).
No. 4.—The Caterpillar of the Flax Moth.
No. 5.—The Purple Cloud (*Actinotia Perspicillaris*).
No. 6.—The Spectacle (*Abrostola Urticæ*).
No. 7.—The Caterpillar of the Spectacle.
No. 8.—The Purple Shades (*Euchalcia Illustris*).
No. 9.—The Caterpillar of the Purple Shades.
No. 10.—The Silver Y (*Plusia Gamma*).
No. 11.—The Caterpillar of the Silver Y.
No. 12.—The Burnished Brass (*Plusia Chrysitis*).
No. 13.—The Caterpillar of the Burnished Brass.

The genus *Periphanes*. The insects of this genus have the antennæ slightly pubescent in the male, and simple in the female ; and the palpi short and entirely clothed with hair. The thorax is crested, and there is a crest on the first segment of the abdomen. The fore wings are slightly falcate at the tip, and are shaded with delicate tones of a rich purplish pink. The Caterpillar resembles those of the *Cucullinæ*, proving the affinity of the two genera. The pupa is subterranean, enclosed in a slight cocoon. Hübner's term, *Periphanes*, has been preferred to the *Charielea* of Stephens, on account of its priority.

Periphanes Delphinii (the Pease-blossom, No. 1) is one of the most lovely of our native Moths, but unfortunately one of the most rare. The Caterpillar (No. 2) feeds on the seeds of the Larkspur. The perfect insect has been captured near Windsor ; at Chelsea ; and in Bulstrode Park.

The genus *Calophasia* has the antennæ very slender, and simple in both sexes. The abdomen slightly depressed and not tufted ; the fore wings are of somewhat short proportion. The larva is slender and attenuated at each end. The pupa is generally attached to the stem of a plant, and enclosed in a stiffly woven cocoon.

Calophasia Linariæ (the Flax Moth, No. 3) is as rare as the preceding ; the only well authenticated captures being the specimens received by the late Mr. Stephens, from Woodside, near Epping. The Caterpillar feeds on the flowers of the common Toad Flax (*Linaria vulgaris*).

The genus *Actinotia*. The insects assigned to this genus have the antennæ slender and simple in both sexes ; the abdomen slightly crested and not depressed. The wings are moderately long, and the fringed edge slightly toothed. The Caterpillars are night feeders upon low growing plants, especially the Starwort. They have the fore part of the body attenuated, and the head very small. The pupa is subterranean. Hübner's name, *Actinotia*, has been preferred to the *Cloantha* of Boisduval, on account of its priority.

Actinotia Perspicillaris (the Purple Cloud, No. 5) is another very rare British insect. It appears in June, and a specimen was taken at that season in a garden at Yarmouth in 1841. Another specimen has since been taken in a spider's web, at Ashford, Hants.

The sixteenth sub-family of the *Noctuidæ* is that of the *Plusidi*, containing three genera : *Abrostola*, *Euchalcia*, and the typical genus, *Plusia*.

The genus *Abrostola*. The insects assigned to this genus have the antennæ slender and simple in both sexes, and the palpi much elevated. The thorax has a double crest. The wings are glossy but dingy in colour. The Caterpillar has the foremost pair of the ventral legs imperfectly developed, thus forming a very natural link with those of the *Plusiæ*, or semi-loopers, which have only two pairs of pro-legs. The pupa is enclosed in a cocoon of silk and moss.

Abrostola Urticæ (the Spectacle, No. 6) has received its popular name from the rather unusual light-coloured marks towards the base of the anterior wings, which, joined as they are by a dark wavy line across the

thorax, form what, with the aid of an active imagination, slightly resembles a pair of spectacles. The Caterpillar (No. 7), in which the front pair of pro-legs are made too conspicuous, feeds upon the common Nettle. The Moth appears in July. It is a common and widely dispersed species.

The other species in this genus is *A. Triplasia* (the Dark Spectacle), which, though not so widely dispersed, is common in the Southern Counties, and especially in the neighbourhood of Bristol and Exeter.

The genus *Euchalcia.* A British insect, formerly included among the *Plusiæ*, is now assigned to Hübner's genus, *Euchalcia.* Mr. Westwood had already stated (in 1843), that although figured by Mr. Curtis in illustration of the genus *Plusia*, he considered it a very aberrant species from the true gold-spangled types of that genus, from which it is now finally separated in the system I am following, though still retained at the head of the *Plusiæ* by some of our English entomologists. The insects included in the genus *Euchalcia* have the long, slender, and simple antennæ, the raised palpi, the elevated thorax with its forked crest, and the crested abdomen, which distinguish the *Plusiæ*; but they are without the metallic brassy patches which distinguish the typical species. The Caterpillars are half-loopers, like those of the *Plusiæ*, that is, having only two pairs of ventral legs. The pupa is enclosed in a loose silken cocoon.

Euchalcia Illustris (the Purple Shades, No. 8) is the only British species assigned to this genus. It was formerly taken in some plenty on Salisbury Plain, but now appears nearly extinct, and is probably entirely so; though, according to Donovan, it has been since taken in South Wales. The Caterpillar (No. 9) is said to feed on *Aconitum lycoctonum* and *Thalictrum aquilegifolium* in the beginning of June, the Moth appearing at the end of that month, or in July. Though so rare with us, it is a common species on the Continent.

The genus *Plusia.* The insects in this genus have the slender and simple antennæ, and all the other characteristics of the former genus as detailed above, and, in addition, the beautiful metallic marks and patches on the anterior wings which render them, as a genus, one of the most beautiful groups in the whole family of *Noctuidæ.*

Plusia Gamma (the Silver Y, No. 10) is the most common of the genus, being found everywhere abundantly. The Caterpillar (No. 11) feeds on a great variety of plants, and there are several broods annually, the Moth appearing from May to October, between which periods it may be seen hovering over flowers, or flying with great rapidity at nearly all hours of the day and evening. The metallic mark in the centre of the anterior wings resembles our lower-case y, from whence its popular name, and also the cursive Greek *gamma* (γ), from which its systematic name is derived. It may be said to form the type of that section of the *Plusiæ* which have small and generally linear metallic marks.

Plusia Chrysitis (the Burnished Brass, No. 12) may be taken as the true type of that section of the genus which is distinguished by broad patches of a gold-like, or rather, perhaps, bright brass-like appearance. The Caterpillar (No. 13) feeds on several kinds of nettle, thistles, &c., in the autumn, passing the winter in the larva state. It is not till the following July that it enters the chrysalis state, the perfect insect appearing in July and August. This resplendent moth is very abundant, and the collector will therefore be able to select fine specimens, as they vary very much, both in size and in the clearness and brilliancy of the metallic markings.

The other species are all handsome, some of them much larger than *Chrysitis.* In the first section, those having only streaks or small marks of metallic character, are the following: *P. Iota* (the Plain Golden Y), far from rare; *P. Pulchrina* (the Beautiful Golden Y), not more rare; *P. Interrogationis* (the Scarce Silver Y), rare, except near Manchester; and *Plusia Bractea* (the Gold Spangle), which occurs in many districts, but is common near Manchester. In the second section, that with the broad metallic patches, there are, *P. Orichalcea* (the Scarce Burnished Brass), which is taken most frequently on the coast near Deal, but found occasionally in inland localities; and *Plusia Festucæ* (the Gold Spot), found in marshy situations, especially at Birkenhead.

P. Bimaculata, *P. Circumflexa*, *P. Chalsytis*, *P. Biloba*, and *P. Aurifera*, are no longer inserted in the British catalogue, being now considered either accidental varieties, or continental species carelessly introduced into British collections.


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PLATE XXIX.

No. 1.—The Bordered Straw (*Heliothis Peltigera*).
No. 2.—The Caterpillar of the Bordered Straw.
No. 3.—The Spotted Clover Moth (*Heliothis Scutosa*).
No. 4.—The Caterpillar of the Spotted Clover Moth.
No. 5.—The Beautiful Yellow Under-wing (*Anarta Myrtilli*).
No. 6.—The Small Yellow Under-wing (*Panemeria Arbuti*).
No. 7.—The Four-spotted (*Acontia Luctuosa*).
No. 8.—The Spotted Sulphur (*Emmelia Sulphuralis*).
No. 9.—The Silver Hook (*Hyela Uncana*).
No. 10.—The Purple Marbled (*Eromene Ostrina*).
No. 11.—The Small Marbled (*Trothisa Haworthana*).
No. 12.—The Marbled White Spot (*Erastria Fuscula*).
No. 13.—The Caterpillar of the Marbled White Spot.
No. 14.—The Small Purple Barred (*Prothymia Æneа*).
No. 15.—The Black-neck (*Ophiusa Pastinum*).
No. 16.—The Caterpillar of the Black-neck.
No. 17.—The Lunar Double Stripe (*Ophiodes Lunaris*).

THE seventeenth sub-family of the *Noctuidæ* is that of the *Heliothidi*, a pretty group of small, but robust insects, mostly distinguished by the strong markings of the underwings, which are, in nearly all cases, of some tone of yellow broadly bordered with black or brown. There are three genera, *Heliothis*, *Anarta*, and *Panemeria*.

The genus *Heliothis*. The insects comprised in this genus have the antennæ simple, those of the male being slightly pubescent. The thorax is without crest, as is the abdomen, which is rather depressed. The larva is slender but not attenuated at the extremities, and it prefers the flowers to the leaves of the plants on which it feeds. The pupa is subterranean.

Heliothis Peltigera (the Bordered Straw, No. 1) is a very rare insect. The Caterpillar (No. 2) feeds on Rest-harrow, Arenaria, and other plants. The perfect insect appears from June to August, and is generally found in clover-fields at mid-day, hovering over the flowers. It has been taken near Manchester, and also at Plymouth, and according to Mr. Stainton, single specimens have been obtained at Cambridge, and at Lower Guiting, on the Cotswold.

The other species are *H. Marginata* (the Bordered Sallow), *H. Armigera* (the Scarce Bordered Straw), *H. Scutosa* (the Spotted Clover Moth, No. 3), the Caterpillar of which is also figured (No. 4), and *H. Dipsacea* (the Marbled Clover). *Dipsacea* and *Marginata* are not very uncommon, but all the others are rare.

The genus *Anarta*. In this genus the insects have the antennæ slightly pubescent in both sexes. The fore wings have irregular markings, the hind wings are of some shade of yellow margined with a deeper colour. The larvæ are short and smooth. The pupa is enclosed in a cocoon of silk mixed with particles of earth.

Anarta Myrtilli (the Beautiful Yellow Under-wing, No. 3) is among the most common of this pretty group. The Caterpillar is green, with stripes, and prettily marked with yellowish patches. It feeds on common Heath, and the perfect insect appears in June and July. It is taken in many places from Lewes to Edinburgh.

The other species of this genus are *A. Cordigera* (the Small Dark-yellow Under-wing) and *A. Melanopa* (the Broad-bordered White Under-wing), both of which are extremely rare, and apparently confined to the North,

as they have only been taken in Scotland, more particularly at Rannoch, in Perthshire, a famous locality for other rare species.

The genus *Panemeria.* This name, that of Hübner's, has been preferred to *Heliodes*, the name given to this genus by M. Guénée, on account of its priority. The insects assigned to it have the antennæ short, and perfectly filiform. The body is slender, which distinguishes them from those of the preceding genus. The wings in repose lie nearly flat, instead of sloping each way. The larva is short and thick, the pupa being of similar proportion, and subterranean. There is but one British species.

Panemeria Arbuti (the Small Yellow Under-wing, No. 6) is one of the commonest of the group. The Caterpillar is pale grayish green, with a dark dorsal line bordered with white, and other lines of white. It feeds on *Cerastium arvense*, and the Moth appears in May and June, flying by day in open situations. Bristol, York, Lewes, and many other places are cited as localities where it has been taken in some plenty.

The eighteenth sub-family of the *Noctuidæ* is that of the *Acontidi.* The distinctive characters of the group are the slender and simple antennæ, the smooth abdomen, and the position of the wings in repose, which completely conceal the under pair and form a very sloping roof. The most marked characteristics are, however, to be found in the preparatory stage, the larvæ having only two pairs of ventral legs, and being, according to some, swollen posteriorly. Only one British genus, *Acontia*, is assigned to this sub-family in the system I am following, though some add the genus *Emmelia*, in which the larvæ are also furnished with twelve legs.

The genus *Acontia* is distinguished by the slender and simple antennæ of the perfect insect, the smooth abdomen, and other characteristics of the group ; and especially by the twelve-legged structure of the caterpillars, a distinctive feature which is absent in one of the two British species assigned to this genus, namely in *A. Luctuosa*, an exception, which M. Guénée describes as unique among the *Noctuæ*, and which appears sufficient to cause this species to be located elsewhere, notwithstanding the characteristics of the perfect insect, which so completely accord with those of the Continental species of *Acontia.*

Acontia Luctuosa (the Four-spotted, No. 7) is a rare insect; Brighton and Lewes being the only places cited for its capture, with the exception of one or two solitary specimens. The Caterpillar is sixteen-legged. The other species in this genus is *A. Solaris* (the Pale Shoulder), which has the ground colour of the anterior wings whitish, especially at the base. The Caterpillar is only furnished with twelve legs, as in the typical insects of the group.

The nineteenth sub-family of the *Noctuidæ* is that of the *Emmelidi.* The character of the markings of the anterior wings, and the hind wings being devoid of conspicuous bands, form the chief distinctions of the *Emmelidi* from the preceding groups. There is but one British species assigned to this sub-family.

The genus *Emmelia.* This genus has the antennæ simple, and the abdomen smooth, but banded. The anterior wings are rather narrow, and beautifully spotted ; the hind wings being of a darkish colour and without maculation. The larva is slender, twelve-legged, and in repose ; the anterior segments are raised, and curved under. The pupa is enclosed in an earthen cocoon.

Emmelia Sulphuralis (the Spotted Sulphur, No. 8) is one of the prettiest of the small Moths comprised in the group of sub-families now under description. The larva is brownish green with lighter stripes, and speckled with yellow. It feeds upon the wild Convolvulus. The Moth appears in June and July, and may sometimes be seen flying about thistle in blossom, in sunny places, but it is very rare. It has, however, been taken in Battersea fields, and several localities in Kent, as Brighton and Lewes ; Cambridge and other places are also noted for its capture.

The genus *Hyela*, the *Hydrelia* of M. Guénée. In this genus the insects have the antennæ short and slightly pubescent in both sexes, and the abdomen crested. The fore wings are slightly rounded at the tip. The larva is slender and has fourteen feet. There are two British species.

Hyela Uncana (The Silver Hook, No. 9) is not an uncommon species, especially in the woods near London. The Caterpillar is said to be pale buff colour striped with darker, and to feed on the Bramble ; but other authorities

describe that which I have assigned to *H. Banksiana* as the larva of *H. Uncana*. It is not uncommon in many places, especially at Lyndhurst, York, &c., and was once taken in some numbers at Cambridge.

Hyela Bankiana (the Silver Barred), the other species, is very scarce. The Caterpillar is green, darker on the back, with a lateral stripe, and has fourteen legs. It feeds on grasses. The perfect insect appears in July, at which season Mr. Haworth was the first to capture it in any number. He discovered it in a boggy situation in Norfolk among reeds and rushes. It has since been taken at Whittlesea Mere and at Killarney. These two species are made separate genera by some authors.

The twentieth sub-family of *Noctuidæ* is that of the *Micradi*, containing two genera, *Eromene* and *Trothisa*.

The genus *Eromene*. The insects in this genus have the antennæ short, and slightly pubescent in the male. The fore wings are pointed at the tip, and are marked with distinct lines, but have no stigmata. The Caterpillars have twelve legs, and are rather thick, but pointed at the extremities. The pupa is found in an oval cocoon spun among leaves. There is only one British species.

Eromene Ostrina (the Purple Marbled, No. 10) is extremely rare. The larva is unknown, but a specimen of the perfect insect was taken near Bideford in 1825.

The genus *Trothisa*. This genus has the antennæ short and filiform in both sexes. The thorax and abdomen are not crested. The wings are deeply fringed. The Caterpillar is thick, with attenuate extremities; and has twelve legs. The pupa is enclosed in a cocoon spun among leaves or moss. The perfect insects fly by day. The hind wings are somewhat narrow, and but faintly bordered with a darker colour.

Trothisa Haworthana (the Small Marbled, No. 11) is very rare, and has been doubted as a true British species. The specimen in the British Museum, from which my drawing was made, is said to have been taken many years ago, but the locality appears uncertain. It is omitted in some British lists.

The twenty-first sub-family of the *Noctuidæ* is that of the *Erastridi*, containing two genera, *Erastria* and *Prothymia*.

The genus *Erastria*. The perfect insects have the antennæ simply filiform in both sexes. The fore wings have some of the ordinary markings of *Noctuidæ* distinctly defined. The hind wings are less narrow than in the last genus, and are more strongly marked in some of the species. The Caterpillars have fourteen legs, and the pupa is formed among leaves or moss. There are two British species.

Erastria Fuscula (The Marbled White Spot, No. 12) is a pretty little insect, the white patch at the posterior angle of the fore wings, and the full unbroken brown tone of the hind wings, giving it a very distinct character. The Caterpillar (No. 13) feeds on the Bramble, and the Moth appears in June. It has been taken at Brighton, Bristol, Lewes, Worcester, &c., and is not at all uncommon in many other localities.

The other species, *E. Venustula* (the Rosy Marbled), is extremely rare. Mr. H. Doubleday, in June, 1845, saw several of this pretty species in a heathy part of Epping Forest, but the next day not a single specimen was to be found. The larva is unknown. No other places are recorded as having afforded recent specimens.

The genus *Prothymia*. The insects assigned to this genus are distinguished from all the nearly-allied species, according to Mr. Westwood, by the long, ascending, compressed palpi, with a long ensiform terminal joint; the antennæ are slender and simple in both sexes. The thorax and abdomen are not crested. The perfect insect flies by day.

Prothymia Ænea (the Small Purple Barred, No. 14) is very variable in the colour of the anterior wings, which are often without the purple tone from which it derives its popular name. The larva has not been accurately described. The Moth appears in June and July, and is not uncommon on heaths in the southern counties.

The twenty-second sub-family of the *Noctuidæ* is that of the *Ophiusidi*, containing the British genera *Ophiusa* and *Ophiodes*.

The genus *Ophiusa*. The insects in this genus are of moderate size. The thorax is smooth, but with

a raised black collar. The wings are not dentate. The larvæ have sixteen legs, the first two pairs of pro-legs being rather short. The pupa is formed in a cocoon. There is only one British species.

Ophiusa Pastinum (the Black-neck, No. 15) is a very widely-dispersed species, though far from common. The Caterpillar (No. 16) feeds on *Astragalus glycyphyllus*, and the Moth appears in July and August, in moist places in woods. Cambridge, Teignmouth, Lewes, York, and especially Scarborough, where it has occurred in abundance, are cited as localities in which it has been taken.

The genus *Ophiodes* is distinguished from *Ophiusa* by the more robust character of the perfect insect, and the distinctness of the lines and stigmata of the anterior wings. In the preparatory stage it is distinguished by the flatness of the larva beneath, and by the forked tubercle on the back of the twelfth segment. The shell of the pupa is remarkably strong, and it is enclosed in a roughly formed cocoon among leaves. There is only one British species.

Ophiodes Lunaris (the Lunar Double Stripe, No. 17) is one of the recent additions to our catalogue of British Moths. Its large size, and some other distinctive characters, have caused it to be assigned by some authors to another sub-family; but on many accounts it finds its place best in its present location. The Caterpillar is described as elongate, and flattened beneath, like those of the *Catocalæ*, to the immediately following family of which, this character serves as a convenient link. It has sixteen legs, the two first pair of pro-legs being shorter than the others, which unites the genus naturally enough with the sub-family *Ophiusidi*. According to Sepp, the colour of the Caterpillar is a brownish grey, with a lateral line of a reddish tone. There are two black spots, edged with red, on the back of the sixth segment, and there is a forked tubercle on the twelfth segment, which is red. It feeds on the Oak. The first British specimen was taken in Hampshire, by Captain Chawner.


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PLATE XXX.

No. 1.—The Old Lady (*Mormo Maura*)

No. 2.—The Caterpillar of the Old Lady.

No. 3.—The Clifden Nonpareil (*Catocăla Fraxini*).

No. 4.—The Caterpillar of the Clifden Nonpareil.

No. 5.—The Red Under-wing (*Catocala Nupta*).

No. 6.—The Caterpillar of the Dark Crimson Under-wing (*Catocala Sponsa*).

No. 7.—The Orange Under-wing (*Brephas Parthenias*).

No. 8.—The Caterpillar of the Orange Under-wing.

No. 9.—The Burnet (*Euclidia Glyphica*).

No. 10.—The Shipton (*Euclidia Mi*).

No. 11.—The Caterpillar of the Shipton.

THE twenty-third, and most splendid sub-family of the *Noctuidæ* is that of the *Catocalidi*, containing two genera, *Mormo* and *Catocala*.

The genus *Mormo*, though located, in the system I follow, with the sub-family *Catocalidi*, is, in other arrangements, differently disposed of. The typical insects of that genus present, in fact, many characteristics which distinguish them pretty widely from the *Catocalæ*. In the first place the only English species, *M. Maura*, flies by night, while the *Catocalæ* are day-fliers. The larvæ are also distinct, not being flattened beneath, and having sixteen perfect feet. The perfect insects, however, have the palpi elevated, and the thorax and abdomen crested. The wings form a deflexed triangle when at rest; the fore wings being short and broad. The chrysalis, also, is powdered with a purple bloom as in the *Catocalæ*, and is enclosed in a silken cocoon.

Mormo Maura (the Old Lady, No. 1) is one of our most conspicuous Moths, and though of dark aspect on the upper side, it has a broad light border underneath, which, at a glance, recalls the aspect of the beautiful butterfly commonly known as the Camberwell Beauty. The Caterpillar (No. 2) feeds on lettuce and other low-growing plants, and occasionally on trees. The Moth appears in July, and frequently enters open windows at night, attracted by lights. It is very common, and very widely dispersed.

The genus *Catocala* comprises some of our most magnificently coloured and largest native Moths, the Red and Lilac Under-wings. The insects assigned to it have the palpi elevated, the antennæ slender, and simple in both sexes. The abdomen attenuated at the extremity, and tufted on the back. The Caterpillars are half-loopers, having one or more pairs of the ventral feet shorter than the others. They are much flattened underneath, and have the edges above the legs fringed with a ridge of hairs. The chrysalis is covered with a purple bloom, and enclosed in a cocoon formed of leaves.

Catocala Fraxini (the Clifden Nonpareil, No. 3) is certainly the most splendid of the British *Noctuidæ*, if not of all our Moths, even including the *Sphingidæ*, for it frequently measures above four inches in the expanse of the wings. The light cool marbled gray of the anterior wings, contrasts very beautifully with the rich lilac, deeply bordered with intense black, of the hinder pair, and the general effect of the insect when fully expanded is very striking. When at rest, and the closed upper wings meet over the back, the chief part of the beauty of the insect is concealed, and from this circumstance it is that the generic name of this handsome group was framed, the meaning of which is, beautiful underneath, from the Greek words κατω under, and καλος beautiful. The Caterpillar (No. 4) feeds on the Ash and other trees, and the Moth appears in August and September. The first specimen captured in this country was taken at Clifden, on the banks of the Thames, in Buckinghamshire; and Mr. J. Stevens has since taken a fine specimen at Hammersmith, by which it would seem that it should be sought in the neighbourhood of water. Other specimens have, however, been taken at Birch-Wood, Guildford,

and Scarborough : and also at Lowestoft, in Suffolk, by G. R. Waterhouse, Esq. The places where its capture has been most recently recorded, are Brighton, Worthing, Burton-on-Trent, and Manchester.

Catocala Nupta (the Red Under-wing, No. 5) is nearly as handsome as the more famous Clifden Beauty, and has the advantage of being common in all the Southern counties. The Caterpillar is greenish gray with white lines, and slight pinkish humps, similar to those of the larva of *C. Fraxini*, on the fifth and twelfth segments ; the fringe above the feet is white. It feeds on Willows and Poplars. The Moth appears in the beginning of August, flying by day, and often settling on the trunks of trees ; but is very shy of an approaching object. Brighton, Bristol, and especially Cambridge, are cited as localities where it abounds ; and in more northerly situations, Worcester, Lyndhurst, &c.

The other species, *C. Promissa* (the Light Crimson Under-wing) and *C. Sponsa* (the Dark Crimson Under-wing) are both smaller than *C. Nupta*, and they are also much less common. They are a very local species, but tolerably plentiful in the New Forest, occurring much farther north than *Nupta*. The Caterpillar of *C. Sponsa* is represented at No. 6. Some of the numerous exotic *Catocalæ* are remarkably splendid.

The twenty-fourth sub-family of the *Noctuidæ* is that of the *Phalænoidi*, containing only one British genus, in one of the species of which the males have pectinated antennæ, while in the other the antennæ are simple in both sexes.

The genus *Brephos*. The insects in this genus have the palpi thickly clothed with long diverging hairs. The wings when at rest are horizontal, the hind wings richly coloured. The larvæ are sixteen-footed, the two anterior pair of pro-legs being smaller than the others. They closely resemble in their movements the perfect loopers of the next great family, dropping from a branch when alarmed, and remaining suspended by a silken thread spun from the mouth. There are two British species.

Brephos Parthenias (the Orange Under-wing, No. 7). The specimen represented is a male. The conspicuously bipectinated antennæ above alluded to being carefully delineated. The female has the antennæ simple. The Caterpillar (No. 8) feeds on Willows ; the Moth appearing at the end of March when the Willows are in blossom, about the flowers of which this species delights to hover. It is not uncommon in rather woody districts, and is very widely dispersed.

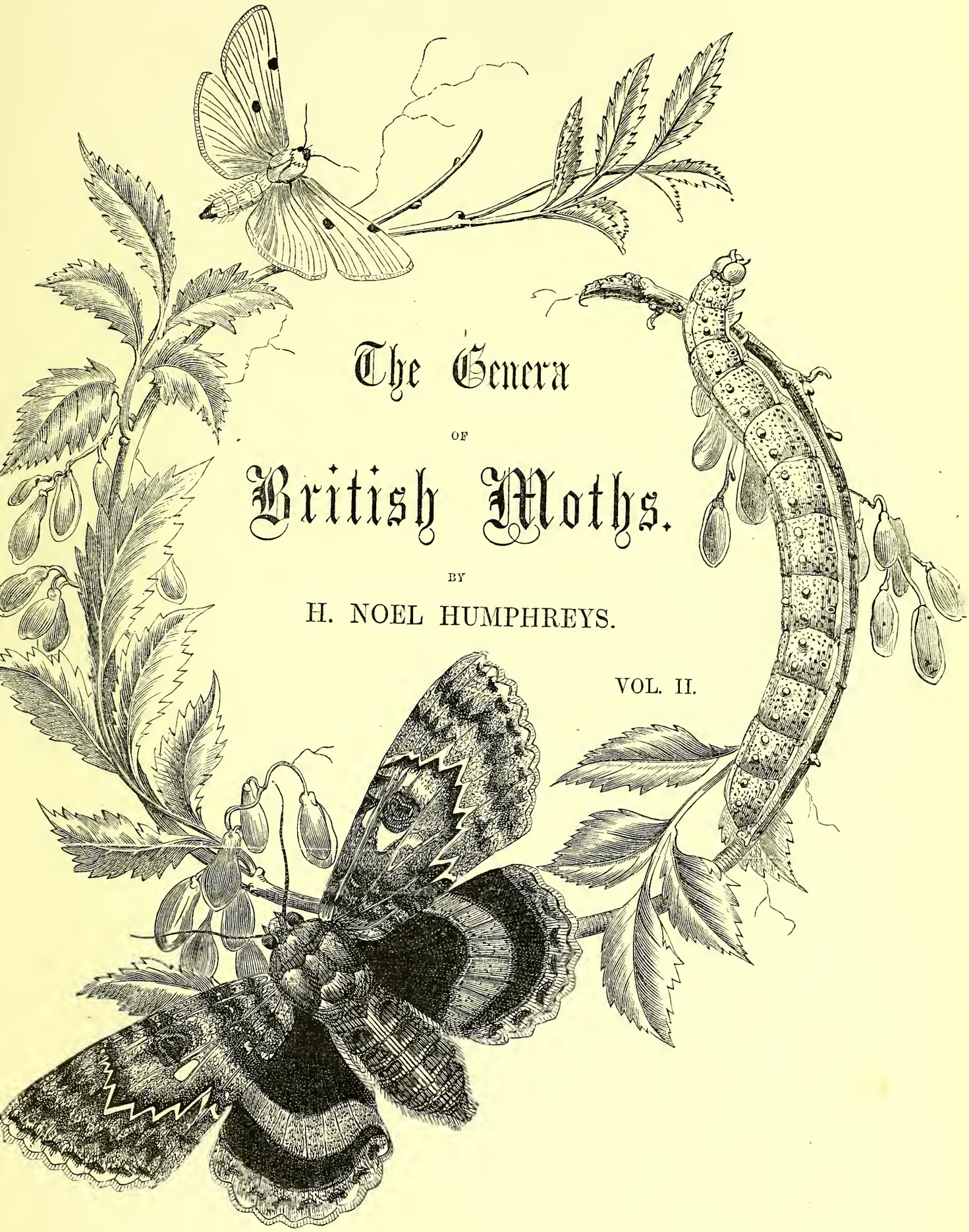
The other species, *B. Notha* (the Light Orange Under-wing), is rarer than the preceding. The antennæ are simple in both sexes ; but the female, though not distinguished from the male by the antennæ, is differently marked, having more of those creamy white patches on the anterior wings which so conspicuously distinguish this species from *B. Parthenias*.

The twenty-fifth and last sub-family of the *Noctuidæ* is that of the *Goniatidi*, in which there is only one British genus, *Euclidia*.

The genus *Euclidia* differs from the preceding in the smaller size of the palpi, but is more especially distinguished by the form of the larvæ, which are very slender, almost vermiform, and have only twelve feet. There are two British species.

Euclidia Glyphica (the Burnet, No. 9) is of about the size, and has somewhat of the general appearance, of the insects in the last-described genus. It is a very common species. The Caterpillar is described as dull ochreous above, and brown underneath, with a white lateral line and a brown head ; it feeds on verbascum, trifolium, and other herbaceous plants, the Moth appearing about the end of June. It is common, and very widely distributed ; the neighbourhoods of Brighton, Manchester, Worcester, York, and many other localities being named as places where it is commonly captured.

The other species of this genus, *Euclidia Mi* (the Shipton, No. 10), is much more beautiful and conspicuous ; the striking contrast of its markings, and their peculiar waving forms, making it a very attractive object to the young collector, who is likely enough to procure specimens during his very first season of collecting, as it is common everywhere. The Caterpillar (No. 11) feeds upon *Medicago falcata*, and also on grasses. The Moth appears in May and June, and may be sought in clover-fields and open meadows, along the hedge-rows.



The Genera
OF
British Moths.

BY

H. NOEL HUMPHREYS.

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PLATE XXXI.

No. 1.—The Black Mountain Moth (*Psodos Trepidaria*).
No. 2.—The Frosted Yellow (*Speranza Limbaria*).
No. 3.—The Caterpillar of the Frosted Yellow.
No. 4.—The Netted Mountain Moth (*Eupisteria Carbonaria*).
No. 5.—The Common Heath (*Fidonia Atomaria*).
No. 6.—The V Moth (*Halia Vauaria*).
No. 7.—The Caterpillar of the V Moth.
No. 8 —The Bordered White (*Bupalus Piniarius*).
No. 9.—The Female of the Bordered White.
No. 10.—The Gray Scalloped Bar (*Mœsia Favillacearia*).
No. 11.—The March Moth (*Alsophila Æscularia*).
No. 12.—The Female of the March Moth.
No. 13.—The Spring Usher (*Anisopteryx Leucopheaiia*).
No. 14.—The Mottled Umber (*Erannis Defoliaria*).
No. 15.—The Female of the Mottled Umber.
No. 16.—The Caterpillar of the Mottled Umber.

Before entering upon the description of the great family of *Geometridæ*, or Loopers, it will be useful to take a rapid general survey of that portion of our subject which we have already discussed; and at the same time to recal the nature of the leading divisions and sub-divisions into which the insects already described have been grouped.

It has been stated that the order *Lepidoptera* is now divided into two grand sections, *Rhopalocera* and *Heterocera*, the former containing the Butterflies (to which I have devoted a separate work), and the latter all the Moths. This last section has also, as we have seen, its divisions and sub-divisions. The first division, *Lepidoptera Crepuscularia*, contains only the Moths of the Sphinx family and its immediate allies, and is consequently a small division. The second division, *Lepidoptera Nocturna*, containing a large proportion of the generally reputed night-flying Moths and others, is, on the other hand, a very extensive one. Its first sub-division, *Lepidoptera Pomeridiana*, forms a rather numerous group, of which the family of *Bombycidæ* may be considered the leading type. Its second sub-division (named like the division itself), *Lepidoptera Nocturna*, contains the family of the *Lithosidæ*, and the great family of *Noctuidæ* with its twenty-five sub-families, the description of which carried my first volume to its close.

The third sub-division of the *Heterocerœ*, upon the description of which I am now entering, is distinguished as, *Lepidoptera Semidiurna*, embracing three families—the *Geometridæ*, the *Platyptericidæ*, and the *Pyralidæ*.

The first family of this sub-division, the *Geometridæ*, is composed of a group of insects which are in many respects very distinct from the great family of the *Noctuidæ*, last described. Nearly all the species have the bodies comparatively slender, and generally small in proportion to the wings, which are of much larger proportionate size than in the *Noctuidæ*, though not so strong in texture or so robustly veined. Another peculiarity which distinguishes them from the *Noctuidæ* is, that when in repose (with the exception of a few that hold the wings erect, like those of a Butterfly) the wings are horizontally extended, showing the upper surface of both pairs, while in the *Noctuidæ* the fore-wings are wrapped over the hinder pair, which they entirely conceal. We also lose sight, in this family, of those characteristic markings, the stigmas and bands, which distinguish the *Noctuidæ*. In the *Geometridæ* these entirely disappear, giving place to markings which, if not of so decided and regular a character, have yet a general family likeness, which can scarcely be mistaken in the most characteristic species. These consist of a more or less dark and irregular spot near the centre of the front wings, above and below which several bands or lines run across the nervures from the front to the back of the wing, frequently forming a series of tolerably regular scallops between each pair of nervures. Two of these bands have sometimes the space between filled with a darker colour, giving a very marked character to the shading of the wings ; while in other cases they are almost entirely absent, or very irregular in their form. It is in the larva state, however, that this family presents the most striking peculiarities. The Caterpillars have only one pair of ventral pro-legs, and that pair the hindermost, consequently near to the pair belonging to the last, or caudal segment. This peculiar formation necessitates a curious action in their mode of progression, which is effected by first fixing

firmly their six pectoral feet to the substance on which they are standing and then drawing close up to them the two posterior pairs of feet, the intermediate segments of the body being raised into a kind of loop, from which they are popularly called "Loopers." The hind feet are then held firmly fixed while the body is again fully extended, when the hind feet are brought close up to them as before, raising the intermediate segments into the loop above described. The repetition of this movement gives these singular Caterpillars the appearance of carefully *measuring* the earth, or any other substance, over which they are travelling; and it is upon this idea that the name *Geometræ* or *Geometridæ* which distinguishes this group of insects is founded; the name being formed of two Greek words, meaning "the earth" and "to measure." Some few of the species have additional pairs of ventral legs, but in almost every case they are very minute, indeed altogether rudimental. The great muscular power of the larvæ of some of the *Geometridæ* is very curious, enabling them to rest entirely upon the two hind pair of pro-legs, with the rest of the body stiffly extended; in which position some of the kinds closely resemble a dead twig of the branch upon which they are resting. The Chrysalides are rarely subterranean, being more often found among dead leaves, sometimes in a loose cocoon, and sometimes suspended by the tail, like those of Butterflies. In the perfect state the females often differ in colouring from the males, and in many species they are wingless; in which cases they present a very singular aspect, and the young Naturalist would hardly be likely to guess that they were Moths. The colour and markings of this family are in general much brighter and more various than in the *Noctuidæ*. Most of the *Geometridæ* fly at various hours of the morning and evening; and but few of them by night.

The first Sub-Family of the *Geometridæ* is that of the *Dasydiadi*, containing two genera—*Psodos* and *Dasydia*.

The genus *Psodos*. In this genus the antennæ are simple in both sexes, but the palpi and thorax remarkably hairy. The wings are rounded, and in markings approaching those of the *Noctuidæ*, with which this genus appears to form a good connecting link, but unfortunately the preparatory stages are but imperfectly known: when they are better understood, it may be found necessary to change its present position. There is only one British species.

Psodos Trepidaria (the Black Mountain Moth, No. 1) is a rare species, confined to alpine districts; the only locality where it has been taken plentifully being among the mountains near Rannoch, in the North of Perthshire. It is very common in Switzerland, and other mountainous parts of the Continent.

The genus *Dasydia*. In this genus the antennæ of the male are pectinated in some species and simple in others, and slightly thickened. The abdomen is much more slender in the male than the female. The wings are dark brown, or nearly black. The preparatory stages are but imperfectly known. Two species of this genus are said to be British, but upon the doubtful grounds of a single capture, in the case of *D. Torvaria*, and but few more in *D. Obfuscaria*. Not having been able to obtain British specimens to draw from, I have not given figures of these two species; the following descriptions will, however, enable Collectors to recognise them if they should be so fortunate as to meet with them.

Dysidia Torvaria may be distinguished by the dark gray-black of the wings, slightly varied with bands of darker, and by the cream-coloured band near the edge on the underside of each wing. The antennæ of the male are pectinated in this species. A single specimen was taken, many years ago, at Ballymena, in Ireland, which Mr. Westwood (Westwood and Humphreys' "British Moths," v. ii. p. 67) refers to in the following note: "My friend, Mr. Templeton, showed me a black *Geometridous* Moth, much larger than the *Minoa Chærophyllata*, which he had captured on one of the mountains in Ireland, of which at the time I made a sketch, which I have unfortunately mislaid," &c., &c.

Dasydia Obfuscaria is also deep grayish black, sometimes with a greenish tone, with darker marks. The larva is said to be violet gray, with a spiracular white line, an oblique dark gray streak on each segment, and having two small humps on the twelfth segment. Specimens of the perfect insect are said to have been taken at Ardrossan, in Arran, and in that famous locality for new species of British *Lepidoptera*, Rannoch, in Perthshire.

The second sub-family of *Geometridæ* is that of the *Fidonidi*, containing six genera.

The genus *Speranza*. In this genus the antennæ are bipectinated in the males. The body is moderately

slender. The wings are somewhat triangular in form, and have a minute tubercle on the upper side near the base. The Caterpillars are smooth, slender, and fond of resting stretched at full length along a slender branch. The perfect insects fly by day, and carry their wings erect when at rest. There are two British species.

Speranza Limbaria (the Frosted Yellow, No. 2) is rather a variable insect, but generally has the wings of a dull orange, with a broadish dark brown border. It is a common species, often found frequenting places where Broom abounds, in May; a second brood appearing at the end of June. The Caterpillar (No. 3) feeds upon the *Cytisus Scoparius*, or common Broom, and is generally rather more slender than it is here represented.

The other species *S. Brunneata* (the Rannoch Looper) has the border of the wings much paler, but has in addition, three wavy bands rather darker than the ground colour, which is browner than in the other species.

The genus *Eupisteria*. In this genus the antennæ are simple in the females and very slightly pubescent in the males. The wings are finely freckled with a peculiar speckled pattern, not unlike net work when seen at a little distance. The wings are robust, and held erect in repose. The larva is rather short; and the pupa is formed in a slight cocoon among dead leaves. There is only one British species.

Eupisteria Carbonaria (the Netted Mountain Moth, No. 4) is the *Phalæna G. Carbonaria*, of *Linnæus*. It is a very local insect. Perthshire and one or two other places being cited as British localities where it has been captured. There is but a single specimen in the British Museum.

The genus *Fidonia*. In this genus the antennæ of the males are strongly bipectinated, the pectinations being long and feathery in some specimens. The females are rather smaller than the males, and have the antennæ simple and extremely slender. The fore-wings are somewhat triangular, but rounded at the tip. The markings generally consist of a general speckling of black or brown extending over both pairs of wings. The larvæ are not attenuated at either extremity, nor humped on any of the segments. The pupæ are subterranean.

Fidonia Atomaria (the Common Heath, No. 5) is a very variable insect, the figure given being taken from a specimen of medium darkness. I have seen specimens in which the specklings are pale gray, others rich brown, and others black. The Caterpillar also is said to be very variable, being, when young, of a yellowish colour, afterwards becoming reddish brown marked with black, and having a pale line at the side, and sometimes a series of dark markings along the back. It feeds on Centaurea, Lotus, &c. The perfect insect appears in June, and is very common on heaths; many places, from Brighton in the south to Glasgow in the north, being recorded for its capture in great abundance.

The other species, *F. Plumaria* (the Bordered Gray), is much more rare.

The genus *Halia*. In this genus the antennæ of the males are pubescent, the abdomen rather thick. The front-wings have the anterior angle slightly rounded; the edge of the hind-wings is rather waved than dentate. The larva is short, with small tubercles and bristly hairs. The pupa is subterranean. There is only one British species.

H. Vauaria (the V Moth, No. 6) is a very common insect. The Caterpillar feeds on different species of Currant, or Ribes, and the Moth appears in June and July, being found commonly in gardens in all parts of the country.

The genus *Bupalus*. In this genus the antennæ of the males are strongly bipectinated to the tips. The females are larger than the males, and have the antennæ simple. The bodies are slender. The wings have a small tubercle near the base, as in a preceding genus, and are carried erect when in repose. The Caterpillars are longitudinally streaked, and are fond of reposing stretched to their full length. The single British species contained in this genus is placed by some English authors in the genus *Fidonia*.

Bupalus Piniarius (the Bordered White, Nos. 8 and 9) is a very pretty and interesting insect. The size and colours of the male and female differ in a singular manner, as will be seen by reference to the figures, No. 8 the male, No. 9 the female. The Caterpillar is described by Dupouchel as green with white and yellow stripes. It feeds on fir-trees, and the perfect insect may be seen flying in plantations of those trees in June. It was formerly considered to be more abundant in the north of England than in the south; but recently it has been seen in great abundance in the neighbourhoods of Brighton, Bristol, Lewes, Pembury, and many other localities of the southern and eastern counties.

The genus *Mœsia*. In this genus the antennæ are pectinated to the tip, but not strongly. The wings are deflexed when in repose, and, contrary to the general characteristics of this family, the fore wings are drawn over the hind ones. The females are much smaller than the males. The larvæ are thick, and have a pointed excrescence on the twelfth segment, the last segment being forked. The pupæ are subterranean.

Mœsia Favillaccaria (the Gray Scalloped Bar, No. 10). This is a variable insect, and the female is smaller and darker coloured than the male. The Caterpillar is described by Treitschke as being slightly humped on the posterior segments, and as being of a bright cinereous tone, paler on the back, with short black streaks and a black line on the second to the fourth segment. It feeds on various kinds of heaths. The insect is found from May to July, and must be sought for in repose, as, unlike most of the species of this family, it does not fly by day, and indeed will not do so even when disturbed. Birkenhead, Edinburgh, Huddersfield, Lyndhurst, and Glasgow are cited as localities where it has been captured recently; as also Manchester, in the neighbourhood of which it has been taken in some abundance.

The third Sub-Family of the *Geometridæ* is that of the *Hibernidi* containing three genera, *Alsophila*, *Anysopteryx*, and *Erannis*, all formerly placed in the genus *Hybernia* of Latreille, (the *Erannis* of Hübner).

The genus *Alsophila*. In this genus the antennæ of the males are very slender, but delicately pectinated. Both the thorax and abdomen are weak and slender. The female is entirely wingless. The caterpillar is slender and twelve-footed, for which reason, principally, the species has been separated from the genus *Erannis* of Hübner.

Alsophila Æscularia (the March Moth, Nos. 11 and 12). The male of this pretty species (No. 11), notwithstanding the slenderness and fragility of the body, has large elongated wings, giving it the appearance of rather a large insect, to which the wingless female, a minute creature (No. 12), forms a very singular contrast. The larvæ, which are described as green with pale longitudinal stripes, feed on the horse chestnut in the autumn. The perfect insect emerges from the Chrysalis in March, when it may be found at rest on walls or palings, its closed wings forming an elongated triangle. It is common everywhere, and in some seasons abundant.

The genus *Anisopteryx*. In this genus the antennæ of the males are slender and finely bipectinated. The females which are perfectly wingless, have the antennæ simple and very slender. In the males the wings are long and of large dimensions in proportion to the body, but of weak texture. The larvæ are rather elongate, with the head round, that is, not flattened as in some of the *Geometridæ*. The Chrysalides are subterranean. This genus has been separated from the genus *Erannis*, in consequence of the entirely wingless character of the females.

A. Leucophearia (the Spring Usher, No. 13). This common insect is very variable in its markings; the delicate lines and slender bands of ordinary specimens forming in others an irregular but nearly solid border of brown at the edges of the fore wings, and another mass of the same colour at the base. The female is perfectly wingless. The Caterpillar is described as yellowish-green marbled with white, the light marks being edged with deep green; it has also a sub-dorsal line of yellow. It feeds on the foliage of the oak and other trees. The perfect insect appears as early as February, and is found throughout the following month. It prefers places where oaks abound, and is common all over the country.

The genus *Erannis*, in the arrangement I am following, is now restricted to three species, in all of which, except *Defoliaria*, the females instead of being perfectly wingless have rudimental wings more or less developed, but in no case fitted for flying. In other respects the characters agree in the main with those of the two last-preceding genera.

Erannis Defoliaria (the Mottled Umber, Nos. 14, 15, and 16). This is a very variable species, the bands in some individuals being much darker than in the one represented (No. 14), and the whole of the anterior wings is suffused with brown in other specimens. The female (No. 15) is nearly wingless. The Caterpillar (No. 16) feeds on Birch, Oak, and other trees, the Moth appearing in October and November; being a very widely dispersed species, and often plentiful. The female, with its wingless body and long legs, has a somewhat spider-like appearance, and should be sought on the trunks of trees, especially at dusk or after dark, with a light.

The other species of *Erannis* are *E. Progemmaria* (the Dotted Border) and *E. Aurantiaria* (the Scarce Umber); the last species being found, with *E. Defoliaria*, up to Christmas, and even in January, in mild seasons.


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PLATE XXXII.

No. 1.—The Pale Brindled Beauty (*Phigalia Pilosaria*).
No. 2.—The Female of the Pale Brindled Beauty.
No. 3.—The Belted Beauty (*Nyssia Zonaria*).
No. 4.—The Female of the Belted Beauty.
No. 5.—The Caterpillar of the Belted Beauty.
No. 6.—The Brindled Beauty, the Male (*Biston Hirtarius*).
No. 7.—The Peppered Moth (*Biston Betularius*).
No. 8.—The Female of the Peppered Moth.
No. 9.—The Caterpillar of the Peppered Moth.

THE fourth Sub-Family of the *Geometridæ* is that of the *Bistonidi*, strikingly distinguished by their robustness, and the strong character of their wings, in both which respects they bear considerable resemblance to the *Noctuidæ*, the characteristic markings of which are, however, entirely replaced by those common to the *Geometridæ*. In the preparatory stage of the *Bistonidi* the family stamp is distinct, the fine large Caterpillars being true Loopers, and exhibiting all the most remarkable characters of the typical *Geometridæ*. There are three genera, *Phigalia*, *Nyssia*, and *Biston*.

The genus *Phigalia* is distinguished by the strongly bipectinated antennæ of the males, the wingless females having them extremely slender, but rather long. The larvæ are thickened towards the head, and bristly; the pupa is subterranean. There is but one British species.

Phigalia Pilosaria (the Brindled Beauty, Nos. 1 and 2) is a pretty Moth, having rather a peculiar aspect from the pilose or hairy appearance of the wings, from which it takes its specific name. The female (No. 2) is a curious wingless creature, of very diminutive size in proportion to the male. The Caterpillar feeds on the foliage of several trees, preferring oak. It remains in the Chrysalis state during the autumn and early winter, the perfect insect often appearing in the commencement of the new year, but more abundantly in February. It is a widely dispersed and abundant species.

The genus *Nyssia*. The insects of this genus are of smaller size than those assigned to *Phigalia*. The males have the antennæ strongly bipectinated; the thorax downy, the abdomen striped transversely; the wings are semi-transparent, the nervures being clothed with dark scales, giving a striped appearance to the wings. The female is wingless; the Caterpillar is long and slender, and free from tubercles or humps; the pupa is subterranean. There are two British species.

Nyssia Zonaria (the Belted Beauty). This pretty species was unknown to our old Collectors, the late Mr. F. Stephens having been delighted with its first discovery during the latter part of his career as an Entomologist. The specific name, *zonaria*, was doubtless conferred in allusion to the alternate zones of black and yellow of the abdomen. The female (No. 4) has the abdomen transversely striped in a similar manner. The Caterpillar (No. 5) feeds in preference on common Millefoil, or Yarrow. It appears both in the spring and autumn, there being two broods a year; and the perfect insect is found from February to April, and again in June and July. It was first discovered on the banks of the Mersey in 1829, where it has since been found in several neighbouring situations in some abundance, especially at Black Rock. Birkenhead and New Brighton, Cheshire, are cited as the most recent places for its capture. The Chrysalides are found buried in the sand at a considerable depth. It is thought that if the sandy shores of other rivers near their junction with the sea were well searched, it would be found that the appearance of this pretty insect is not confined to the banks of the Mersey.

The other species, *N. Hispidaria* (the Small Brindled Beauty) bears a close resemblance to *Phigalia Pilosaria*, for which it might sometimes be mistaken but for its smaller size. The female is apterous. It is not a very rare species, but is rather local. Manchester, Lyndhurst, and Scarborough are mentioned as places where it has been recently captured in some abundance.

The genus *Biston* is strongly distinguished from the two other genera of this Sub-Family by the character of the females, which are not only furnished with wings, like the males, but are in two of the genera decidedly larger and generally more robust. The males have deeply pectinated antennæ, the females having them simple and very slender. The bodies are robust. The wings of the females though larger, are less densely clothed with scales. The larvæ are smooth, attenuated towards the head, and having two small humps on the twelfth segment. The pupa is rather short, and subterranean. There are three British species.

Biston Betularius (the Peppered Moth, Nos. 7, 8, and 9). This handsome and conspicuous insect is the largest of the *Geometridæ*, and the young Collector will be glad to learn that it is plentiful everywhere, that is, in any situation where Birch or Beech trees abound. The male (No. 7) is very much smaller than the female, but more strongly marked, and distinguished by its deeply pectinated antennæ. The female (No. 8) is generally paler, and the filiform antennæ mostly marked with alternate annulations of black and white. The Caterpillar (No. 9) is a very handsome and peculiar creature, holding itself perfectly stiff, notwithstanding its slenderness and length, when supported only on the hind legs. It feeds on Birch, Beech, Elm, and on Fir in September, passing the autumn and winter in the Chrysalis stage, and the perfect insect appearing in the following May. It is the last of the group to appear, the whole of them being early spring insects. It is found most abundantly in woods.

The other species are *B. Prodromarius* and *B. Hirtarius*. *B. Prodromarius* (the Oak Beauty, sometimes called the Dark Pepper) bears a strong general resemblance to the *P. Betularius*. It is of nearly the same size, the most obvious distinction being the darker character of the powdering of dark brown spots which form themselves near the base of the front-wings and again near the external edge, into two broad and nearly solid bands of dark brown. The hind-wings are paler brown, whitish, and speckled at the border. It is much more rare than *P. Betularius:* but in some places found abundantly ; near Manchester, for instance in some seasons, and in less plenty near Brighton, Bristol, Plymouth, and other widely distant localities. By some Lepidopterists this species is placed in Treitschke's genus *Amphidosis*. *B. Hirtarius* (No. 6) is the commonest of the genus, especially in the suburbs of London, where, at the end of March or in April, wherever poplars abound, specimens may be found under the trees by hundreds. It is much like *P. Pilosaria*, but more strongly marked, and may be at once distinguished by the woolly character of the whole insect; the surface of the wings being in great part covered with short and nearly erect hairs. It is on this account a peculiar-looking insect, and the fine brown brindling renders it very conspicuous and handsome. Some Collectors call it the Cockney, as being found so plentifully in London, even in crowded streets, if there be but a few poplars in the neighbourhood. It appears, however, but for a very short time in this abundance, and specimens should therefore be secured on the first opportunity, or the chance may be lost till the following season.


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PLATE XXXIII.

No. 1.—The Feathered Thorn (*Himera Pennaria*).
No. 2.—The Caterpillar of the Feathered Thorn.
No. 3.—The Scalloped Oak (*Crocallis Elinguaria*).
No. 4.—The Caterpillar of the Scalloped Oak.
No. 5.—The Scalloped Hazel (*Odontopera Bidentata*).
No. 6.—The Caterpillar of the Scalloped Hazel.
No. 7.—The Large Thorn (*Odoptera Alniaria*).
No. 8.—The Canary-shouldered Thorn (*Odoptera Tiliaria*).
No. 9.—The Caterpillar of the Canary Thorn.
No. 10.—The September Thorn (*Odoptera Erosaria*).
No. 11.—The Caterpillar of the September Thorn.
No. 12.—The August Thorn (*Odoptera Angularia*).
No. 13.—The Caterpillar of the August Thorn.
No. 14.—The Purple Thorn (*Odoptera Illustraria*).

THE fifth Sub-Family of the *Geometridæ* is that of the *Odopteridi*, containing a very homogeneous series of genera, the most prominent of which are the group popularly known as the 'Thorns,' which are nearly all distinguished by the deeply indented outline of the wings, as implied by the term *Odopteridi*, formed of two Greek words signifying indented wings. There are ten genera in the *Odopteridi*. *Himera*, *Crocallis*, *Odontopera*, *Odoptera*, *Pericallia*, *Angerona*, *Opistograptis*, *Ourapteryx*, *Eudalimia*, and *Ellopia*.

The genus *Himera*. This genus is distinguished by the deeply pectinated, or rather feathered, antennæ of the males. The anterior wings are waved, but not dentate in the outline; the hind-wings being simply rounded. The wings of the female are narrower. The larvæ are of long, but not slender proportion, with a single hump on the twelfth segment. The pupæ are subterranean. There is only one British species. In the robustness of the body this genus exhibits some affinity with the *Bistonidi*, while in the waved outline of the anterior wings it approaches the typical *Odopteridi*, thus forming a link between the two Sub-Families.

Himera Pennata (the Feathered Thorn, No. 1) is remarkable for the length of the pectinations of the antennæ of the male, which have a feather-like appearance that has suggested both the systematic and popular specific names. The antennæ in the female are simple, and the wings narrow. The Caterpillar (No. 2) feeds on Oak and other forest trees, the Moth appearing towards the close of autumn. It is a common and very widely dispersed species. Bristol, Halton in Buckinghamshire, Plymouth, and other places, are cited as localities in which it has been taken in great abundance.

The genus *Crocallis*. This genus presents many of the same characters as the last. The antennæ of the male are pectinated, but not plumose. The body is stout, the wings a little indented. The larvæ are "twig-like," but slightly clothed with hair, and thickened towards the tail. They devour with avidity other Caterpillars. The pupæ are subterranean. There is but one British species.

Crocallis Elinguaria (the Scalloped Oak, No. 3). The Caterpillar of this species feeds on the foliage of various fruit-trees and also on the Oak. The perfect insect appears in August. It is common everywhere.

The genus *Odontopera*. In this genus we have the first types of the class with the deeply indentated wings which give their name to the Sub-Family under description. The larvæ have two additional pair of ventral pro-legs; but they are only partially developed, and are not used in walking. The pupæ are subterranean. There is, however, but one British species, most of the species of 'Thorns' having been placed in the following closely allied genus.

Odontopera Bidentata (the Scalloped Hazel, Nos. 5 and 6). In this genus, as illustrated by the present species, the antennæ are still less pectinated than in the last-described genus; the three genera *Himera*, *Cro-*

callis, and *Odontopera*, forming three distinctly graduated steps in the depth of the pectinations, which though strong, are very shallow in *Odontopera Bidentata*. The double-toothed projection at the prominent part of the edge of the front-wings of the insect is expressed in the specific name. The hind-wings also begin to be dentate, but not to the extent which we shall meet with in the next genus. The Caterpillar (No. 6) feeds on Alder and other trees. There are two broods of them ; the perfect insect appearing both in April and June. It is common everywhere.

The genus *Odoptera*. In this genus we find the types of the Sub-Family *Odopteridi ;* the deeply indented edges of the wings giving them a peculiar and distinct character, such as serves very commonly as the leading typical mark of a Sub-Family. There are eight British species in this well defined genus, of which five are represented in the annexed Plate.

Odoptera Alniaria (the Large Thorn, No. 7) is by far the largest British insect belonging to this genus ; but its right to be considered really a British species, is scarcely as yet sufficiently established. There is, however, a specimen in the British Museum, captured in England ; and specimens have been taken at Brighton, Margate, and near the North Foreland Lighthouse ; *possibly*, stragglers from the opposite shores brought over in a gale, for the insect is common on the Continent. The specimen in the Museum is a female, but the Continental specimen from which my drawing was made, is of the other sex, as indicated by the strongly pectinated antennæ. The Caterpillar is described as brown marbled with whitish, and having a protuberance on the back of the seventh and at each side of the twelfth segment. It feeds on Alder, Birch, and other trees.

Odoptera Tiliaria (the Canary-shouldered Thorn, Nos. 8 and 9) may be distinguished at once by the colour of the silky hairs with which the thorax is clothed, and upon which the popular name of this pretty species is founded. It is the *Geometra Canaria* of Hübner. The Caterpillar (No. 9) is one of the most curiously formed of the genus, though still bearing a strong family likeness to its relatives. The great enlargement of the third segment from the head, where it joins the last pectoral legs, and the sharp protuberances on the back, increasing in size as they reach the thickened hinder part of the body, give it a curiously rugged appearance, somewhat similar to that of the Caterpillar of *O. Lunaria*, in which, however, the protuberances are not so remarkable. It feeds on Birch and Oak, and the Moth appears in August. It is very common.

Odoptera Erosaria (the September Thorn, Nos. 10 and 11). This species has been figured principally on account of the large size and somewhat distinct characters of the Caterpillar. It appears in September, as its popular name imports ; and though less abundant than some of the preceding, is not uncommon. Lewes, Lyndhurst, York, and other widely distant localities, are cited as places of its recent capture.

Odoptera Angularia (the August Thorn, Nos. 12 and 13) has the wings more deeply indented than others of the species ; on which account I give a figure of it, as being in this respect the typical species of the group in so far as the British species are concerned. The Caterpillar feeds on several trees. The perfect insect appears in August, and is very common. Worthing, Brighton, Exeter, York, and other places, are named where it is ordinarily abundant.

Odoptera Illustraria (the Purple Thorn, No. 14). This species is the most richly coloured, and in that respect the handsomest of the whole group. The Caterpillar feeds on oak, and the Moth appears in May and June. It is much more rare than either of the species ; being found sparingly in the woods of Kent, in the New Forest, and in Devonshire.

There are three other species. *O. Fuscantaria* has the front-wings narrower and less dentate, and they are but little variegated, being deep ochre with a nearly solid band of a deeper colour at the external edge, and two narrower transverse streaks ; the hind-wings being dusky-brown. *O. Lunaria* closely resembles *Illustraria*, but is smaller and much less richly coloured. *O. Illunaria* is also somewhat like *O. Illustraria*, but has a broadish pinkish stripe down the front of the fore-wings and the hind-wings are only marked by very pale transverse bands. Many varieties of these last, and of the other species, were formerly ranked as distinct species under various names which have now disappeared from the British Catalogue, except as synonyms.


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PLATE XXXIV.

No. 1.—The Lilac Beauty (*Pericallia Syringaria*).
No. 2.—The Caterpillar of the Lilac Beauty.
No. 3.—The Chrysalis of the Lilac Beauty.
No. 4.—The Orange Moth (*Angerona Prunaria*).
No. 5.—The Caterpillar of the Orange Moth.
No. 6.—The Brimstone Moth (*Opistograptis Crataegata*).
No. 7.—The Caterpillar of the Brimstone Moth.
No. 8.—The Swallow-tailed Moth (*Ourapteryx Sambucaria*).
No. 9.—The Caterpillar of the Swallow-tailed Moth.
No. 10.—The Cocoon of the Swallow-tailed Moth.
No. 11.—The Light Emerald (*Eudalimia Margaritaria*).
No. 12.—The Barred Red (*Ellopia Fasciaria*).

The genera of Moths represented in this Plate continue the illustration of the sub-family *Odopteridi*.

The genus *Pericallia* is well distinguished from the last genus, both in the perfect and preparatory stages. In the perfect state both sexes have the antennæ pectinated, while it is only the males that are so distinguished in the genus *Odontera*. In the Caterpillar state the two slender excrescences on the eighth segment form a peculiar and sufficient generic distinction. There is only one British species.

Pericallia Syringaria (the Lilac Beauty, No. 1). This is a very pretty insect, very closely resembling *O. Illunaria*, figured in the last Plate, from which, and all the *Odopteræ*, it is however distinguished by the peculiarities alluded to in describing the generic characters. The Caterpillar (No. 2) feeds on Privet, Lilac, Syringa, and other shrubs, as well as the Clematis, on which it is represented. The Moth is found in gardens and woods, and is not common, though widely dispersed. Exeter, Halton in Buckinghamshire, and Wavendon near Newport Pagnel, are recorded as places where it has occurred in some abundance.

The genus *Angerona*. The insects assigned to this genus are distinguished from those belonging to the preceding by the greater slenderness of the body, the larger proportion of the wings, and the smooth outline of the anterior pair, which are free from the irregular projections which distinguish the "Thorns." The antennæ are slender and short, being pectinated, but not deeply, in the males. The Caterpillars are somewhat elongate, with protuberances on the fifth, ninth, and twelfth, and two small projecting points on the anal segments. The pupa is enclosed between leaves.

Angerona Prunaria (the Orange Moth, No. 4) is one of the commonest Moths of our woods and copses. It is extremely variable in colour; the orange ground being sometimes of a pale straw colour, and the darker portion a warm grey. The wings of the female (which is rather larger than the male) are entirely of the paler colour, which gives it the appearance of a distinct species. The Caterpillar (No. 5) varies in intensity of colour, like the perfect insect. It feeds on the foliage of the Plum, from which it takes its specific name, and also upon several other trees. It is common almost everywhere.

The genus *Opistograptis* is distinguished by the antennæ of the males, which are so slightly ciliated as to appear simple. The palpi are unusually short, and the margins of the wings are free from indentation. The Caterpillars have two more ventral legs than those of the last genus, but they are only rudimental, and not used in walking. The Chrysalis is enclosed in a thick cocoon. The term *Opistograptis*, adopted by Hübner in 1816, has been preferred to that of Duponchel, *Rumia*, which only dates from 1829.

Opistograptis Crataegata (the Brimstone Moth, No. 6). This pretty and common species is abundant

wherever Whitethorn grows, the foliage of which is its principal food in the larva state. The Caterpillar (No. 7) varies in its general tone of colour from fawn to gray. The perfect insect appears in April, June, and August, there being several broods.

The genus *Ourapteryx* is principally distinguished, as the term implies, by the tail-like projections of the hind-wings of the insects assigned to it, which give them somewhat the general form of Butterflies, of the genus *Papilio*. The insects of this genus are farther distinguished by the pointed form of the anterior wings. The antennæ are simple, or only slightly ciliated in both sexes. The Caterpillars are of long proportions, and have lateral projections from the posterior joints of the eighth and twelfth segments. The Chrysalis is found in a cocoon formed of leaves webbed together, and sometimes suspended. There is but one British species.

Ourapteryx Sambucaria (the Swallow-tailed Moth, No. 8) is one of the largest and most conspicuous of the group to which it belongs. The Caterpillar (No. 9) is dark reddish-brown or nearly red, variegated as represented. It feeds on various trees, and the Moth appears in June. It is very common in the Southern and Midland Counties of England, but becomes rarer in more Northern districts, and has not yet been observed in Scotland. The Chrysalis, contained in the suspended cocoon (No. 10), should be procured for any Collection intended to be tolerably complete, as it forms a very curious and interesting object.

The genus *Eudalimia*. The insects assigned to this genus are very nearly allied to those of the last, and have a slight projection on the margin of the hind wings. They are, however, distinguished by the deeply pectinated antennæ of the males, and also by the form of the Caterpillars, which are slightly flattened beneath, like those of the *Catocalæ*, with fleshy fringe above the legs, which are twelve in number, the additional pair being sufficiently developed for use in walking. The pupa is formed in the ground.

The name here used has been preferred to the "*Metrocampa*" of Latreille, as being of anterior date. There is but one British species.

Eudalimia Margaritaria (the Light Emerald, No. 11). This pretty insect is far from uncommon if sought in the proper places,—namely, woods, or shady places where large trees abound. Its delicate colouring and silvery gloss make it a great favourite with Collectors. The Caterpillar is described as brownish-green, with a black dorsal line and a row of white dots on each side. It feeds on Birch, Beech, Hornbeam, &c. Its appearance is not confined to the more southerly districts, like the preceding, the neighbourhood of Edinburgh being cited as one of the localities in which it is found most abundantly.

The genus *Ellopia*. The insects assigned to this genus are closely allied to those of the last, especially in the preparatory stages, the Caterpillars being flattened in a similar manner. They are, however, distinguished by the rounded form of the wings and their semi-transparency, and by the Chrysalis, which is enclosed in a web among leaves.

Ellopia Fasciaria (the Barred Red, No. 12). This pretty insect has received its specific names, both popular and systematic, from the broad band or fascia of deeper colour which runs across the wings. The Caterpillar is described as reddish-gray, paler on the back, with a series of brownish dorsal marks, which are partially divided into a kind of heart-like form by a dark line. It feeds on Fir, and the Moth appears about the end of June ; but it is rarely found except in Pine plantations, and then not plentifully. The neighbourhood of Brighton, Manchester, York, &c., are recorded as localities in which it has recently been observed in some abundance.


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PLATE XXXV.

No. 1.—The Large Emerald (*Geometra Papilionaria*).
No. 2.—The Caterpillar of the Large Emerald.
No. 3.—The Small Emerald (*Jodis Vernaria*).
No. 4.—The Caterpillar of the Small Emerald.
No. 5.—The Grass Emerald (*Pseudoterpna Cythisaria*).
No. 6.—The Caterpillar of the Grass Emerald.
No. 7.—The Essex Emerald (*Euchloris Smaragdaria*).
No. 8.—The Blotched Emerald (*Comibæna Bajularia*).
No. 9.—The Caterpillar of the Blotched Emerald.

THE sub-family illustrated in this Plate is that of the *Geometridi*. It contains five genera: *Geometra*, *Jodis*, *Pseudoterpna*, *Euchloris*, and *Comibæna;* and comprises nearly all the Moths popularly known as the "Emeralds."

The genus *Geometra*. The insects assigned to this genus have the antennæ of the males pectinated, the abdomen smooth and small, the wings large, and the hind-wings generally scalloped at the fringed edge. The larvæ are short, and generally small in proportion to the perfect insect. The pupa is enclosed in a transparent cocoon.

Geometra Papilionaria (the Large Emerald, No. 1) is one of the handsomest of the small bodied Moths of this group, and fresh specimens are remarkably handsome, being of a brilliant grass or emerald green; but the brightness of this colour fades very rapidly, and this insect as seen in Collections exhibits but a faint tinge of its original colour. The Caterpillar (No. 2) feeds on Birch, Nut, Beech, and other trees, and the Moth appears in July. It is rarely found except in woods. The neighbourhood of Bristol is cited for its recent capture in some abundance; and it may be said to be very widely distributed, even as far north as Dumbartonshire and Renfrewshire.

The insects assigned to the genus *Jodis* are of much smaller size than the preceding. They are distinguished by having the antennæ of the males only slightly pectinated and filiform at the points, and by very slender palpi. The Caterpillars are free from protuberances, and, with their regular longitudinal stripes and bifid head, are very distinct from those of the preceding genus.

Jodis Vernaria (the Small Emerald, No. 3). This very pretty species is of a bright but whitish green, very difficult to imitate in a drawing. The Caterpillar (No. 4) feeds on Oak and other trees, and the Moth appears in July. It is most frequently found on chalky soils, but may be considered rare; but in recent years it has been taken commonly near Bristol.

Some English authors describe a second species, smaller, and of a paler and still more delicate green; this is *J. Lactearia*.

The genus *Pseudoterpna*. The insects assigned to this genus have the antennæ of the male slightly pectinated; and the abdomen is crested in both sexes on the third and fourth segments. The larva is very rigid, has two excrescent points on the second and last segments, and the head is bifid. The Chrysalis is green, and enclosed in a slightly webbed cocoon. There is but one British species.

Pseudoterpna Cythisaria (the Grass Emerald, No. 5) is a common insect in favourable localities. It is of

a much duller green than any other of the group, and sometimes greenish-gray. The Caterpillar feeds on common Broom, on Heaths or Warrens, and the Moth appears in July. It is found as far north as Ayrshire.

The genus *Euchloris.* This genus contains a single British species, separated from *Geometra* on account of the habits of the Caterpillar, which clothes itself with portions of small leaves, seed vessels, scales of flowers, or other vegetable fragments, which it binds together so as to form a kind of shell or habitation, which it carries about with it somewhat after the manner of the singular larvæ of the *Psychidæ.* The larva otherwise resembles in general conformation that of *Geometra Papilionaria*, which has caused some English authors to place *E. Smaragdaria* in the same genus.

Euchloris Smaragdaria (the Essex Emerald, No. 7). This rare species has only been found at present on the Essex coast. The first specimen discovered was reared from a Caterpillar found by Mr. C. Parsons, near South Church, Essex, in June 1826. Specimens have since been taken at Southend and St. Osyth, both on the Essex coast.

The genus *Comibæna.* This is another genus established on the conformation and habits of the Caterpillar, rather than the characters of the perfect insect. Like the preceding, the Caterpillars of this genus form for themselves shells composed of portions of leaves, bark, &c. They are also humped in a similar manner on several of the segments, and may perhaps eventually, on farther revision of the group, be placed in the genus *Smaragdaria*, notwithstanding the existence of minute distinctions, unnecessary to allude to in a work of strictly popular character.

Comibæna Bajularia (the Blotched Emerald, No. 8) is not an abundant species. The Caterpillar (No. 9) feeds upon Oak, partially covered by its case of bark, lichens, &c. It is represented in the Plate without its protecting case. The Moth appears in Oak woods in July, and has been recently taken near Brighton, Bristol, Stowmarket, Tenterden, York, and other places.


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PLATE XXXVI.

No. 1.—The Speckled Beauty (*Cleora Viduaria*).
No. 2.—The Waved Black (*Parascotia Fuliginaria*).
No. 3.—The Caterpillar of the Waved Black.
No. 4.—The Dusky Carpet (*Tephronia Corticaria*).
No. 5.—The Great Oak Beauty (*Alcis Roboraria*).
No. 6.—The Caterpillar of the Great Oak Beauty.
No. 7.—The Willow Beauty (*Alcis Rhomboidaria*).
No. 8.—The Caterpillar of the Willow Beauty.
No. 9.—The Waved Umber (*Hemerophila Abruptaria*).
No. 10.—The Brindled White Spot (*Boarmia Extersaria*).
No. 11.—The Engrailed (*Boarmia Laricaria*).
No. 12.—The Caterpillar of the Engrailed.

THE seventh sub-family of the *Geometridæ* is that of the *Cleoridi*, containing three genera, *Cleora*, *Parascotia*, and *Tephronia*.

The genus *Cleora*. The insects in this genus have the antennæ pectinated in the males; in *C. Lichenaria* to the tip, while in *C. Viduaria* and *C. Glabraria* the points are filiform. The wings are extended horizontally in repose, and have the fringe deep, and spotted at the ends of the nervures. The Caterpillars feed on Lichens, and have humps on several of the segments. The Chrysalis is formed in a slight cocoon, among leaves and moss.

Cleora Viduaria (the Speckled Beauty, No. 1). This elegantly marked species is very variable, some specimens being much more darkly dappled than the one figured, while in others the maculations are nearly obsolete. The larva is not well known, but the perfect insect has been taken in the New Forest in May and June, and more recently at Brighton and Lyndhurst.

The following are the other species of *Cleora*: *C. Glabraria* (the Dotted Carpet), closely resembling *C. Viduaria*, but smaller. It is comparatively common, but local. Its capture is recorded in the Lake district, the New Forest, and Edinburgh. *C. Cinctaria*, by some classed as a *Boarmia*, has the front-wings whitish-gray, mottled in a similar manner, but generally darker than the other species. It has been taken at Brighton, Lyndhurst, and Dalmally. *C. Lichenaria* has the ground colour of the wings light brown.

The genus *Parascotia*. The insects assigned to this genus have the body rather small and the wings ample. The latter are generally of a dark brownish colour, traversed by many waved bands of a somewhat lighter tone. The larvæ are without humps, but are covered with bristle-bearing tubercles. The Chrysalis is subterranean. There is but one British species.

Parascotia Fuliginaria (the Waved Black, No. 2). This insect is very rare. It was formerly taken occasionally in the neighbourhood of London, at long intervals, but there is no recent record of its capture. The Caterpillar (No. 3) feeds on Lichens, and the perfect insect should be looked for from July to September.

The genus *Tephronia* of Hübner; the *Mniophila* of Boisduval. The British insects assigned to this genus have the antennæ of the males pectinated; the fore-wings oblong, the hind-wings rounded; their flight is nocturnal. There is but one British species.

Tephronia Corticaria (the Dusky Carpet, No. 4). This insect is inserted in our catalogues as British on the strength of a single capture, only one British specimen being known. The larva is said to vary in colour from dirty white to gray, and greenish, with a paler line on the back, widening at each segment. It is found on Lichens growing upon walls, generally in a northern aspect. The unique specimen in the British Museum, from which my illustration is copied, was taken at Tenby, in South Wales, many years ago, by Dr. Leach.

The eighth sub-family of *Geometridæ* is that of the *Boarmidi*, consisting of three genera: *Alcis*, *Hemerophila*, and *Boarmia*.

The genus *Alcis*. The insects assigned to this genus are in general much larger than the preceding, and have slender bodies but ample wings, very beautifully and regularly variegated. They have the antennæ pectinated in the males, but not to the tip, which is generally filiform; and the fringed edges of the wings are slightly dentated. The Caterpillars are twig-like, but not long and slender, and have both humps, and lateral projections near the joints of the segments; the head being frequently withdrawn partially within the second segment. The Chrysalides are subterranean. There are, according to the arrangement I am following, five species. The term *Alcis*, adopted by Curtis in 1825, has been preferred, as anterior to that of Boisduval, whose term, *Boarmia*, only dates from 1840.

Alcis Roboraria (the Great Oak Beauty, No. 5) is by far the largest and handsomest of the genus. The Caterpillar (No. 6) feeds on the Oak, Beech, &c.; and the Moth appears in June. It was formerly taken in the woods of the Southern Counties, but sparingly; more recently it has been taken commonly in the neighbourhood of Manchester and Tenterden; Lewes, Lyndhurst, and West Wickham being also recorded as localities where it has been captured.

Alcis Rhomboidaria (the Willow Beauty, No. 7) is much smaller than the preceding, and so variable in appearance, in consequence of the ground being, in some specimens, nearly as dark as the markings, that the varieties are often mistaken for distinct species. The one figured is a medium specimen. This insect is common everywhere in England, but rather scarce in Scotland. The Caterpillar (No. 8) feeds on Oak, Plum, and other trees, and is found in woods, and on hedge rows; the perfect insect appearing in July.

The other species are the following: *A. Consortaria* (the Pale Oak Beauty) strongly resembles *A. Roboraria*, but is rather smaller, and the markings are uniformly paler. This species is rare; Brighton, Lyndhurst, and Pembury in Kent, being cited as localities in which it has been taken recently. *A. Abietaria* (the Satin Carpet) has the front wings grayish-black and glossy, with the markings darker. The female is rather paler, and sometimes suffused with an orange tone. *A. Repandata* (the Mottled Beauty) has the general character of *A. Roboraria*, but the ground colour of the wings is reddish ochre, inclining to umber.

The genus *Hemerophila*. The insects comprised in this genus have the antennæ pectinated nearly to the tip. The wings are moderately large, the hinder pair being deeply dentate in the only British species. The Caterpillars are not humped; they have the head sub-quadrate, and feed exposed on the leaves of shrubs. The Chrysalis is formed in the angle of a stem, and enclosed in a tough cocoon of web.

Hemerophila Abruptaria (the Waved Umber, No. 9). This is a very prettily marked and conspicuous insect. The Caterpillar feeds upon Lilac and other shrubs, in the spring; the perfect insect appearing in June, in gardens, woods, and orchards. It was formerly deemed far from common, but its capture in abundance in many widely different localities has been recently recorded, especially at Bristol and Stowmarket; and in somewhat less abundance at Exeter, Lewes, Tenterden, and other places.

The genus *Boarmia*. The British species assigned to this genus have the antennæ pilose beneath, instead of pectinated. The wings are ample, and dentate. The larvæ are elongate and devoid of humps, and have several longitudinal lines. The Chrysalis is generally formed amongst Moss.

Boarmia Extersaria (the Brindled White Spot, No. 10). This pretty species has a white mark left by the wave of a darkish bar near the external margin of the front wings, from which it takes its name. The Caterpillar is described by Crewe as being pale gray, clouded with reddish-brown. It feeds on Birch. This species is rare,

but widely distributed, having been recently taken at Brighton, Bristol, Stowe Wood, Oxfordshire; and many other places.

B. Laricaria (the Engrailed, No. 11) is the largest and handsomest of the genus. It is found in woods in March and April. The larva, which still remains undescribed, is known to feed on Larch. This fine species may be considered rare, but has been taken recently at Brighton, Bristol, Lyndhurst, Manchester, Worcester, and doubtless in other localities. The Caterpillar represented at No. 12 is that assigned by Hübner to an allied insect bearing one of the specific synonyms of *B. Laricaria*, but probably belonging to another species.

The other species are the following: *B. Consonaria* (the Square Spot) resembles in general character *B. Extersaria*, but has the engrailed bands broader, darker, and more suffused, and the white mark squarer in form. It was formerly considered very rare, but has been taken in great abundance recently at Halton, in Buckinghamshire, and in some plenty in several other localities. *B. Crepuscularia* (the Small Engrailed) closely resembles *B. Laricaria*, but is paler, and the markings are often less sharply defined; it is also rather smaller. *B. Punctularia* (the Gray Birch) is much smaller than either of the preceding; and is of a dull gray, the markings being indistinct, and powdered with blackish specks. It is very common in woods in May. Bristol and Manchester are recorded as places where it has recently been taken in great abundance; and it is, in fact, plentiful in all favourable localities.


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PLATE XXXVII.

No. 1.—The Scotch Annulet (*Charissa obfuscata*).

No. 2.—The Brown Annulet (*Gnophos pullata*).

No. 3.—The Barred Umber (*Anagoge pulveraria*).

No. 4.—The Caterpillar of the Barred Umber.

No. 4½.—The Chrysalis of the Birch Mocha.

No. 5.—The Common White Wave (*Cabera pusaria*).

No. 6.—The Caterpillar of the Common White Wave.

No. 7.—The Gray Carpet (*Aleucis pictaria*).

No. 8.—The Birch Mocha (*Ephyra pendularia*).

No. 9.—A Variety of the Birch Mocha.

No. 9½.—The Caterpillar of the Birch Mocha—Chrysalis of the Birch Mocha (see No. 4½).

No. 10.—The Dingy Mocha (*Ephyra orbicularia*).

No. 11.—The Clay Triple-lines (*Ephyra trilineata*).

THE *Gnophidi* form the ninth sub-family of the *Geometridæ*, and contain but two British genera: *Charissa* and *Gnophos*.

The genus *Charissa*. The insects assigned to this genus present a peculiarity in the antennæ of the male, the joints of which are, according to Mr. Westwood, "compressed and produced internally." The palpi are short and straight, and do not lean together producing the form of a beak. The abdomen is long and slender; the wings are ample, and the fringed edge of the hinder pair is but very slightly indented; those insects having the edge of the hind wings strongly indented, which were formerly classed as *Charissæ*, having been removed to another genus. The Caterpillars are short, and have a bifid tail. Only one British species is now assigned to the genus *Charissa*.

Charissa obfuscata (the Scotch Annulet, No. 1) is a rare and local insect, being found chiefly in the North, in the Islands of Arran and Bute, and at Flisk on the Scottish coast. The Caterpillar is not well known.

The genus *Gnophos*. The insects assigned to this genus have the antennæ of the male simple, but slightly thickened. The hind wings are dentate. The Caterpillar is short, with two small humps on the twelfth segment, and a bifid tail. The Chrysalis is subterranean.

Gnophos pullata (the Brown Annulet, No. 2). This insect was formerly included in the genus *Charissa* as *C. Pullata*. It is found in August in many places along the south coast, and in some localities it is very abundant at that time, especially in the Isle of Wight. It is also found in Wales. The Caterpillar is unknown.

There is another species, *G. obscurata*, the wings of which are very much darker than those of *G. pullata*.

The tenth sub-family of the *Geometridæ* is that of the *Caberidi*, containing four genera: *Anagoge*, *Cabera*, *Aleucis*, and *Ephyra*.

The genus *Anagoge* (the *Numeria* of Duponchel) contains but one British species. The characteristics of the genus are—antennæ of males bipectinated, except at the extreme tip, and the wings rounded and not dentate. The Caterpillars are slender, with small dorsal humps on the hinder segments; and the head is bifid. The Chrysalis is formed in a cocoon among leaves.

Anagoge pulveraria (the Barred Umber, No. 3). This is rather a common species in woods. The Caterpillar (No. 4) feeds on the Sallow. The perfect insect appears in June. The neighbourhoods of Brighton, Bristol, and many other places as far North as Argyleshire, are recorded as localities in which it has been recently captured in some abundance.

The genus *Cabera*. The insects assigned to this genus have the antennæ of the males slightly bipectinated

nearly to the tip. The wings are delicate, rounded, and free from denticulation at the margin. The larvæ are of rather long proportions, and have two minute spines on the last segment. The Chrysalides are formed in earthen cocoons or under moss. Most of the species appear to be double brooded. There are three British species.

Cabera pusaria (the Common White Wave, No. 5). This species, like *Anagoge pulveraria*, is very abundant in woods. The Caterpillar feeds on the foliage of several forest trees, and the perfect insect appears in May, and again in July and August, there being two broods.

The other species are: *C. rotundaria*, the Round-winged Wave, rather smaller than the preceding, though very closely resembling it; and *C. exanthemata* (the Common Wave), larger than either of the preceding, and of a delicate cream colour instead of gray. In this last species the third band near the base of the fore wings is sometimes blended more or less with the next, and these varieties were made a species by Haworth, as *C. approximaria*. Specimens more thickly powdered with the dark colour, were by the same author distinguished as *C. arenosaria*.

The genus *Alcucis*. The insects assigned to this genus have the antennæ simple in both sexes, and slender. The fore wings are pointed at the tip, and the hind wings much rounded. The Caterpillar is undescribed. The only British species was formerly classed as a *Cleora*.

Alcucis pictaria (the Gray Carpet, No. 7). This is a very rare insect. It was at first found only in Kent, in the neighbourhood of Dartford, especially on a particular fence on the heath; but Colchester and Lewes have been lately cited as places where it has occurred.

The genus *Ephyra*. The insects assigned to this genus are of exceedingly delicate structure. The males have the antennæ bipectinated nearly to the tip. The hind wings are slightly angulated towards the middle, and both pairs have generally a ring-like mark near the centre. The Caterpillars are slender and have no humps, the head being slightly bifid. The small Chrysalides are somewhat angulated, and might be taken at a glance for those of some small butterfly, being attached to a branch by a knot of web at the tail, and a loop round the middle.

Ephyra pendularia (the Birch Mocha, No. 8) is perhaps the commonest of the genus, and is found plentifully in Birch woods, but not everywhere, being somewhat local. The Caterpillar (No. 9½) feeds on Birch and Alder, and the Moth appears in the beginning of June, and again in August, being double brooded. The Chrysalis (No. 4½) is slung to a twig.

Ephyra trilinearia (the Clay Triple-lines, No. 11) is by no means so common as the preceding, but is occasionally plentiful in Beech woods, in the North of England. The Caterpillar is described by Crew as being of a reddish brown colour, variegated with yellow, and as feeding on the Beech. At Halton, in Buckinghamshire, it has lately been taken in very great abundance; and Brighton, Lewes, Plymouth, and other places are named as good localities for its capture.

The other species are: *E. porata* (the False Mocha), distinguished by its warm brownish colour, getting paler towards the edges of the wings. *E. punctaria* (the Maiden's Blush) is a common species; it is rather grayish in colour, shading to ochreous, and dusted with blackish. *E. omicronaria* (the Mocha) is also among the commonest species of this genus. It may be distinguished by the colour of the external portion of the wings up to the outer band being of a much yellower colour than that of the interior portion, and so forming a broad yellowish border. *E. orbicularia* (the Dingy Mocha, No. 10) is the most rare. It may be at once distinguished by the browner colour of the wings, in which the circular marks in the centre appear conspicuously white; and also by the form of the hind wings, which at the fringed edge converge to a point near the centre. This rather rare species has been found recently near Brighton, Lewes, Lyndhurst, Tenterden, and Worthing.


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PLATE XXXVIII.

No. 1.—The Blood-Vein (*Bradyepetes amataria*).
No. 2.—The Caterpillar of the Blood-Vein.
No. 3.—The Dark-bordered Beauty (*Epione vespertaria*).
No. 4.—The Caterpillar of the Dark-bordered Beauty.
No. 5.—The Scorched Wing (*Plagodis dolabraria*).
No. 6.—The Caterpillar of the Scorched Wing.
No. 7.—The Straw Belle (*Aspilates gilvaria*).
No. 8.—The Grass Wave (*Perconia strigillaria*).
No. 9.—The Caterpillar of the Grass Wave.
No. 10.—The Belle (*Ortholitha plumbaria*).
No. 11.—The Brown Silver Line (*Lozogramma petraria*).
No. 12.—The Oblique Striped (*Mesogramma lineolata*).

The eleventh sub-family of the *Geometridæ* is that of the *Epionidi*, containing three genera : *Bradyepetes*, *Epione*, and *Plagodis*.

The genus *Bradyepetes*. The insects assigned to this genus have the antennæ rather strongly bipectinated nearly to the tip. The fore wings are sharp at the anterior angle, and rather hooked ; the hind wings being strongly angulated in the middle of the margin. The Caterpillars are short and dilated towards the head. The Chrysalides are formed among leaves. There is only one British species.

Bradyepetes amataria (the Blood-Vein, No. 1). This pretty species is tolerably common everywhere. The Caterpillar (No. 2) feeds on Sorrel and other herbaceous plants. The perfect insect appears in June.

The genus *Epione*. The species of which this genus is composed, have the antennæ of the males pectinated quite to the tips. The front wings are acute at the anterior angle, with the fringed margin extending into a projection in the middle, and the hind wings are indented in the centre of the margin. The Caterpillars are slender and attenuated towards the head. The Chrysalides are enclosed in a cocoon among leaves.

Epione vespertaria (the Dark-bordered Beauty, No. 3). This beautiful species is very rare. The Caterpillar is ashy brown, having the anterior segments striped with white, and the rest of the body mottled. It feeds on the Hazel, and the perfect insect appears in May. It appears to be rather a northern insect, having occurred principally in Yorkshire and the adjoining counties.

There are two other species. *E. apiciaria* (the Bordered Beauty) is far less rare than the preceding species, and is found in damp, shady lanes, appearing in July. *E. advenaria* (the Little Thorn), closely resembles the other species in form and markings ; but is of light cream colour, the bands and speckles being of pale brown. In appears in woods in June, but is not common.

The genus *Plagodis*. The insects forming this genus (the *Eurymene* of Duponchel) have the antennæ of the male pectinated, and the fore wings oblong, projecting in the middle of the fringed edge. The hind wings are pointed in the middle of the posterior margin and slightly indented at the angle next the body. The Caterpillar is twig-like, with a hump on the ninth segment, and the head is rather forked at the top. The Chrysalis is subterranean. There is but one species.

Plagodis dolabraria (the Scorched Wing, No. 5) is a widely-dispersed, but rather uncommon species. The Caterpillar (No. 6) feeds on Oak and Lime, and the perfect insect appears about the end of June. It has been recently taken in some plenty near Halton in Buckinghamshire, and at Tenterden ; its capture has been recorded also at Brighton, Bristol, Plymouth, York, and several other places.

The twelfth sub-family of *Geometridæ* is that of the *Aspilatidi*, containing five genera : *Aspilates*, *Perconia*, *Ortholitha*, *Lozogramma*, and *Mesogramma*.

The genus *Aspilates*. All the species in this genus have the antennæ of the males pectinated to the tip. The fore wings are rather straight at the margin, and have a single transverse bar of a deeper colour than the ground. The hind wings are rounded and have but a very faint band. The Caterpillars are not humped, but have two *points* on the last segment. The Chrysalides are enclosed in an earthen cocoon. There are two British species.

Aspilates gilvaria (the Straw Belle, No. 7). This pretty insect is extremely local. It is, however, found in many places in Kent, in some plenty, and in profusion on the downs behind Dover Castle. The Caterpillar is described as whitish, with a faint rosy tinge, and dorsal and sub-dorsal lines of reddish gray, and two spines on the last segment. It feeds on Millefoil, and the perfect insect appears in August. New localities frequented by this insect have been recently discovered, among which Exeter, Ipswich, and especially Box-Hill in Surrey, may be cited.

The other species is *A. citraria* (the Yellow Belle), distinguished by two oblique brownish bars across the fore wings, and single bands strongly marked on the hind wings; but it is a very variable insect, and some specimens have all the wings of a pale straw colour, the hind wings being rather paler than the front pair. The Straw Wave, which is placed by some authors along with *Aspilates*, is, in the system I am following, placed in another genus.

The genus *Perconia*. This genus contains only one British species, *strigillaria*, and the characters which distinguish this insect from those assigned to the former genus, are principally the dentation of the hind wings, and some slight differences in the preparatory stages.

Perconia strigillaria (the Grass Wave, No. 8). This common insect varies exceedingly in its markings. Those with only three equidistant bands were formerly made a separate genus, as *Geometra respersaria*; and those with unequal bands, as *Geometra inequaria*. The Caterpillar feeds on the Broom, and the perfect insect appears in June, frequenting heaths, where it is very common.

The genus *Ortholitha* (the *Phasiane* of Duponchel). The insects assigned to this genus have the antennæ of the males only very slightly bipectinated, the palpi long, and lying close together in the form of a beak. The fore wings are pointed at the anterior angle, the hind wings rounded, both pair being free from denticulation at the margin. There is but one British species.

Ortholitha plumbaria (the Belle, No. 10). This pretty and strongly marked insect is very common, and widely dispersed. It frequents heaths and woods in May, and again in August, being double brooded. The Caterpillar is not well known.

The genus *Lozogramma*. The insects of this genus have the antennæ of the male simple, and the abdomen long and slender; the fore wings are rather broad at the fringed margin, and pointed at the tip; and the hind wings rather rounded. The Caterpillars have not been described. There is but one British species.

Lozogramma petraria (the Brown Silver Line, No. 11) is not a very common insect; but in June, and again in August, it may be taken in plenty wherever Fern abounds.

The genus *Mesogramma*. The insects in this genus have the antennæ simple in both sexes. The palpi are short; the body is also short. The fore wings are rather triangular, the hind wings are small. The Caterpillars are smooth, with pale stripes, and have ten feet. There is now only one British species allowed, though six were formerly assigned to the genus.

Mesogramma lineolata (the Oblique Striped, No. 12). This is by no means a rare species. It is very variable, one of the varieties having been considered a species, as *Phibalapteryx virgata*. The Caterpillar is described as reddish brown, with a broad yellow line on each side, and a brown head. It feeds on *Galium verum*, and the perfect insect is found from May to the middle of August, especially on heaths, where it is in many places abundant.


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PLATE XXXIX.

No. 1.—The Manchester Treble-bar (*Celma imbutata*).
No. 2.—The Slender Treble-bar (*Anaitis plagiata*).
No. 3.—The Small Mallow (*Eubolia mensuraria*).
No. 3½.—The Chalk Carpet (*Eusebia bipunctaria*).
No. 4.—The Mottled Gray (*Erinobia multistrigaria*).
No. 5.—The Welsh Wave (*Venusia cambrica*).
No. 6.—The Twin-spot Carpet (*Coremia didymata*).
No. 7.—The Garden Carpet (*Coremia fluctuata*).
No. 8.—The Caterpillar of the Garden Carpet.
No. 9.—The Silver-ground Carpet (*Coremia montanata*).
No. 10.—The Green Carpet (*Coremia miaria*).

The thirteenth sub-family of the *Geometridæ* is that of the *Eubolidi*, containing seven genera : *Celma*, *Anaitis*, *Eubolia*, *Eusebia*, *Erinobia*, *Venusia*, and *Coremia*.

The genus *Celma*. The insects assigned to this genus (founded by Stephens) have the palpi unusually scaly, and the antennæ simple in both sexes, those of the male being rather pubescent. The anterior wings are somewhat inclining to the lancet-shape, and the abdomen is short. The females are smaller than the males. The Caterpillars are rather strong, and the Chrysalides are formed among moss. There is but one species, which is placed by some authors in Hübner's genus *Carsia*.

Celma imbutata (the Manchester Treble-bar, No. 1) is a very local species. The Caterpillar is described as reddish yellow, with three violet lines or stripes ; it feeds on one or more species of *Vaccinium*. The perfect insect appears in August ; and was formerly taken occasionally in heathy places in the North of England, and in Scotland, but considered a rarity. It has, however, been since taken in the neighbourhood of Manchester in great abundance, and in one or two other new localities.

The genus *Anaitis*. The insects in this genus have the antennæ simple in both sexes, and the palpi close together or beak-like. The fore wings are rather lancet-shaped ; the females are larger than the males. The Caterpillars are long and slender, with a velvety surface, delicately striped. The Chrysalides are oblong. There are two British species.

Anaitis plagiata (the Slender Treble-bar, No. 2) is a common species in woody localities almost everywhere. The Caterpillar, which is described as reddish brown with a black dorsal line and a yellow line at the side, feeds on *Hypericum perforatum ;* and there are seemingly two broods, as the perfect insect appears both in June and September. Brighton, Cambridge, Exeter, Arran, and Bute are cited by entomologists as localities where it is plentiful.

The other species is *Anaitis præformata* (the Purple Treble-bar). It has the anterior wings less acute, and is rather brighter coloured. It is placed in the British catalogue on account of one or two doubtful captures ; but some authors do not consider it British.

The genus *Eubolia*. The insects assigned to this genus have the antennæ of the males either pectinated or strongly pubescent ; the wings are broad, the fore wings rather pointed. The Caterpillars have ten feet, and are rather thicker in the last segments. The Chrysalides are subterranean. There are three British species in the system I am following, which some authors make five by placing our *Eusebia bipunctaria* and *Mesogramma lineolata* in this genus.

Eubolia mensuraria (the Small Mallow, No. 3). This pretty, but common insect is sometimes called the Aurelian's plague, from its excessive abundance, filling his net to the exclusion of rarer and more desirable specimens. The Caterpillar has not been accurately described; but it is said to be of a yellowish green colour, and to feed on Grass. The perfect insect appears in July and August, and is common everywhere.

The other species are :—*E. cervinata* (the Mallow Moth) which may be distinguished by its somewhat larger size, and by its much browner colouring, the markings being very similar to the preceding; *E. mœniata* is about the size of the first species, but browner, with some of the bands variegated with straw colour. Only one specimen has yet been captured of this rare insect; it was taken near Carlisle.

The genus *Eusebia.* To this genus of Duponchel a single British species has been assigned, which is generally placed in *Eubolia*, the *Larentia* of Treitschke. The wings are more rounded than in the preceding genus, and the antennæ of the males of this genus only slightly pectinate. The Caterpillars are thick, and striped.

Eusebia bipunctaria (the Chalk Carpet, No. 3½) is a very local, but yet abundant species. The Caterpillar is of a pale brownish gray colour, with darker lines. It feeds on Clover; and the perfect insect appears in June, and is very plentiful in lime and chalk districts. Many places are cited where it appears sometimes in extreme abundance, as Lewes, Cambridge, Eden, Dene, Dover, &c.

The genus *Erinobia.* A species, formerly placed in Treitschke's genus *Larentia*, has been, for slight distinctions of character, assigned to this genus; these are the curious dottings on the nervures of the anterior wings, the nearly simple antennæ, &c., &c. Mr. Westwood, as early as 1845, suggested the propriety of removing *Larentia multistrigaria* from the genus *Larentia.*

Erinobia multistrigaria (the Mottled Gray, No. 4) was formerly considered a rare insect. The Caterpillar is described by Shiel as dark with lateral markings of brown; it feeds on Bedstraw. The perfect insect appears in March, and used to be taken on heaths near London, and also in Norfolk. It is now found abundantly at Birkenhead, Bristol, Lewes, Manchester, and Plymouth, and in some plenty in many other places.

The genus *Venusia.* In the insects assigned to this genus, the antennæ of the males are slightly bipectinated, the pectinations being rather longest at the tips. The abdomen is slender, and the wings rather rounded and free from indentations. The preparatory stages are unknown. There is but one British species.

Venusia Cambrica (the Welsh Wave, No. 5). This was formerly considered a very rare insect, the Devil's Bridge in Cardiganshire being the only locality recorded for its capture. The Caterpillar is unknown; but the perfect insect appears in June or July. It is now found in some plenty at Huddersfield, the Lake Districts, Manchester, Stowmarket, and Sheffield.

The genus *Coremia.* The insects assigned to this genus have the antennæ of the males either pectinated or pubescent. They have generally a series of spots at the side of the abdomen. The Caterpillars are ten-footed. The Chrysalides are subterranean. There are eleven British species.

Coremia didymata (the Twin-spot Carpet, No. 6) is widely dispersed, but was once thought a very local species. The Caterpillar is, according to Sepp, grass green with a white line at the side. The perfect insect appears at the end of July, the female being much paler than the male. It now is considered by practical entomologists to be plentiful everywhere.

Coremia fluctuata (the Garden Carpet, No. 7). This is a common species. The Caterpillar (No. 8) feeds on several garden plants—Horse-radish, Cabbage, &c. The perfect insect appears throughout the summer in gardens, and even in houses, in the country.

Coremia montanata (the Silver-ground Carpet, No. 9). This handsome species is abundant everywhere. The Caterpillar is said to be dull whitish, with several gray-brown stripes, and a white line above the legs. It feeds on Primrose, in woods, where the perfect insect appears in June.

Coremia miaria (the Green Carpet, No. 10). This beautiful insect is almost as abundant as the preceding. The preparatory stages are unknown. The perfect insect appears in woods and shady lanes in June.

The other species are the following: *C. salicata* (the Striped Twin-spot Carpet) closely resembles *C. didymata*, but is much smaller. *C. ferrugata* (the Red Twin-spot Carpet) has the dark portions of the wings much deeper than in the two last-named species, and the light bands clearer; in size it is less than the

first and larger than the last. *C. unidentaria* (the Dark-barred Twin-spot Carpet) is a very variable insect, but can generally be distinguished at once by the very broad and dark band, bordered with light, which crosses the centre of the brown ground of the fore wings. *C. ligustrata* (the Large Twin-spot Carpet) is much like the preceding in the broad band, but the ground colour is more ochreous in the fore-wings and clearer in the hind wings, and the insect is considerably larger. *C. olivata* (the Beech-green Carpet) resembles the two last in the broad band, but the ground colour is green, the dark bands being bordered with cream colour or pale ochre, and there is a small patch of ochre in the centre of the dark band. *C. propugnata* (the Flame Carpet) is again very distinct, the ground being flesh colour, with the broad band deep olive with a patch of lighter tone in its centre, the hind wings being entirely of a pale reddish brown or flesh tone. *C. munitata* (the Red Carpet) is also very distinct, the ground colour being warm pale brown, with the broad and strong red-brown, approaching red. All these pretty species are tolerably common, and some very abundant; *C. olivata* is found chiefly in birch woods; *C. salicata*, a northern species, is the most rare.


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PLATE XL.

No. 1.—The Northern Spinach Moth (*Electra populata*).
No. 2.—The Caterpillar of the Northern Spinach Moth.
No. 3.—The Clouded Yellow (*Harpalyce fulvata*).
No. 4.—The Caterpillar of the Clouded Yellow.
No. 5.—The Chrysalis of the Clouded Yellow.
No. 6.—The Purple Bar (*Harpalyce ocellata*).
No. 7.—The Caterpillar of the Purple Bar.
No. 8.—The Phœnix (*Steganolophia prunata*).
No. 9.—The Caterpillar of the Phœnix.
No. 10.—The Chrysalis of the Phœnix.
No. 11—The Shoulder Stripe (*Lampropteryx badiata*).
No. 12.—The Caterpillar of the Shoulder Stripe.
No. 13.—The Barberry Carpet (*Anticlea berberata*).
No. 14.—The Caterpillar of the Barberry Carpet.
No. 15.—The Chrysalis of the Barberry Carpet.
No. 16.—The Cocoon of the Barberry Carpet.
No. 17.—The Royal Mantle (*Anticlea sinuata*).
No. 18.—The Yellow-ringed Carpet (*Aplocera flavicinctata*)
No. 19.—The Autumn Green Carpet (*Chloroclysta miata*).

THE fourteenth sub-family of the *Geometridæ* is that of *Cidaridi*, containing fifteen genera: *Electra*, *Harpalyce*, *Steganolophia*, *Lampropteryx*, *Anticlea*, *Aplocera*, *Chloroclysta*, *Hydriomena*, *Polyphasia*, *Thera*, *Cheimatobia*, *Oporabia*, *Acasis*, *Lobophora* and *Eupithecia*.

The genus *Electra* (the *Cidaria* of Treitschke). The insects assigned to this genus, are pretty generally distinguished by the various yellow tints of their wings, the anterior pair having a rather narrower and more elongate form than in the preceding group, and having also the anterior tip marked by an oblique stripe or patch of a light or dark colour. The antennæ are generally simple in both sexes. The body is rather long, especially in the males, which have a tuft at the extremity. The Caterpillars are slender, and attenuated towards the head, which is often of forked or bifid form. The Chrysalides are distinguished as being frequently of various colours. There are six British species.

Electra populata (the Northern Spinach Moth, No 1). The appearance of this insect was formerly considered to be confined to Scotland and the North of England, but it has recently been discovered plentifully in more southern districts. The caterpillar (No 2) feeds on Poplar, and the perfect insect appears in July. In the neighbourhood of Huddersfield and Edinburgh it is found in great abundance; and in less plenty in southern localities, such as Brighton, Darenth Wood, Plymouth, &c.

The other species are *E. sagittata* (the Marsh Carpet) having the front wings of pale brown, with a broad cross band on a basal patch of blue-black, edged with a bright border of white. *E. chenopodiata* closely resembles *E. populata*, but has the dark band stronger, and the oblique patch at the angle of the front wings reduced to a broadish streak. *E. achatinata* (the Broad Chiverned Moth) is very like the preceding, but paler, and has two brightish cream-coloured bands near the margin of the fore wings, one enclosing the oblique blotch, and the other at the outside of a partly obsolete dark band. *E. pyraliata* (the Barred Straw) is distinguished by having three narrow bands across the fore wings, and a row of spots near the edge. *E. marmorata* (the Spinach) is very like *populata*, but rather larger, and has the band more distinctly defined, and the ground in some places lighter. It is the handsomest of the genus. These species are all common except the strikingly marked *E. sagittata*, which at present has only been found in the fens of Cambridgeshire, and is very rare.

The genus *Harpalyce* formerly containing eleven British species, is now restricted to six, the others having been more correctly located in other genera. Those retained in this genus have the antennæ of both sexes simple. The wings are short and triangular, and all four wings are extended, forming a broad triangle when the insect is at rest. The caterpillars are ten footed, and the chrysalides smooth, and often varied in colour.

Harpalyce fulvata (the Clouded Yellow, No. 3). This pretty insect is very common. The Caterpillar (No. 4) feeds on the foliage of the Rose-tree, and the perfect insect appears in July. It is common everywhere and often abundant. The Chrysalis is represented at No 5.

Harpalyce ocellata (the Purple Bar, No. 6). This is a very common and widely dispersed insect. The Caterpillar (No. 7) feeds on Bedstraw ; and the moth appears in June, and a second brood in August.

The other species are *H. galiata* (the Galium Carpet) which is rather like the preceding, but may be easily distinguished by the dark patch on the front edge of the fore wings between the broad dark band and the tip, and by its smaller size. *H. picata* (the Short Cloak Carpet) has the light ground very much covered by the dark markings, especially near the margin ; it is rather larger than the last. *H. corylata* (the Broken-barred Carpet) has the cloudy band next the fringe of the anterior wings interrupted by a white patch at the tip and another in the middle, forming two rather conspicuous pale marks. *H. silaceata* (the small Phœnix Moth) has the broad dark band in the centre of the anterior wings interrupted by three delicate white streaks, formed by the white colour of three of its traversing nervures. These are all common except *H. corylata*, which is less so than some others, and *H. galiata*, which is generally confined to the more southern districts, being abundant at Plymouth.

The genus *Steganolophia*. To this genus, founded by F. Stephens, the author assigned a single British species. The males of the species assigned to it have a tuft of hair near the base of the fore wings, beneath. The palpi are larger and more beak-like than in the allied genera, and the transverse bands of the hind wings are very remarkable for their distinctness and regularity. The Caterpillar is ten footed, and has the hinder segments rather enlarged, and the head slightly bifid.

Steganolophia prunata (the Phœnix, No 8). This handsome insect is not plentiful, but is very widely dispersed. The Caterpillar No. 9 feeds on Sallow and Bilbery, Gooseberry, &c., &c. ; and the perfect insect appears in July and August in lanes and gardens. The Chrysalis is represented at No. 10. Huddersfield and Edinburgh are cited as localities in which it has been recently taken in great abundance ; but it has also been taken, though sparingly, at Brighton, Darenth, and other places in the southern districts.

The genus *Lampropteryx*. The insects assigned to this genus by its author the late Mr. Stephens, have the antennæ of the males rather strongly ciliated. The palpi are very short, and the wings are glossy. The Caterpillars are ten footed, slender, and naked. There are two British species.

Lampropteryx badiata (the Shoulder Stripe, No. 11). This is a widely dispersed but local insect. The Caterpillar (No. 12), feeds on the Rose, &c. The perfect insect appears in April.

The other species is *L. suffumata* (the Water Carpet), which instead of the light central bands of the last species, has a broad dark corresponding band. It is very generally distributed and often abundant.

The genus *Anticlea*. The insects assigned to this genus have the antennæ of the males simple, the wings not dentated, and the front pair rather pointed at the anterior angle ; the central band being generally pale. The Caterpillars are rather long and slender, and have generally the habit of curving under the first segments. The Chrysalides are generally found in a compact earthen cocoon. There are four British species.

Anticlea berberata (the Barberry Carpet, No. 13). This is a very local insect. The Caterpillar (No. 14) feeds on the Barberry, and the Moth appears in May, June, and August. It was formerly taken sparingly in Berkshire and Oxfordshire ; but the neighbourhood of Cambridge is now cited as a locality in which it is occasionally found in abundance. The Chrysalis and cocoon are shown at Nos. 15, 16.

Anticlea sinuata (the Royal Mantle, No. 17). This is also a rare species. The broad pale central band of the anterior wings is conspicuously marked in this species. The Caterpillar is said to be green with a broad yellow stripe on the back, and a purplish line on each side, edged beneath with greenish yellow. It feeds on one or more species of Bedstraw, and the Moth appears at the end of June. The old localities of its capture are in Kent, Devonshire, and Berkshire ; but it is now taken much more abundantly in Cambridgeshire.

The other species are the following. *A. rubidata* (the Flame) has the light portion of the central band much less broad and conspicuous, and the hind wings nearly covered with thin waved bands, the general colour being a pinkish brown of different shades. *A. derivata* (the Streamer) is very like *A. berberata*, but is larger, and has the dark bands nearest the body more strongly and sharply marked, and the hind wings are without the narrow dark border and second band which distinguishes *A. berberata*.

The genus *Aplocera*. The insects in this genus have the antennæ of the males pubescent or slightly pectinated; the wings entire and rounded, but sometimes the fore pair are rather pointed at the anterior angle. The Caterpillars are attenuated towards the head. There are two British species, both placed by some authors in the genus *Larentia* of M. Guénée.

Aplocera flavicinctata (the Yellow-ringed Carpet, No. 18) is a very local insect, but abundant occasionally in some places. The Caterpillar is described as being of a dull green colour, with a row of reddish triangular spots edged with white, along the back. It feeds on *Saxifraga granulata*, and the perfect insect appears at the beginning of the autumn. It is rare, but has been found as far north as Perthshire. M. Guénée, as I am informed by Mr. Logan of Duddington, who is studying the group, considers this species distinct from the *Flavicinctata* of Hübner, and has named it *Ruficinctata*.

The other species, *Aplocera cæsiata* (the February Carpet), is much more common. It may be distinguished by the conspicuousness of the central band, which is edged with a distinct white line.

The genus *Chloroclysta*. The insects in this genus have the antennæ of the males entirely simple, or only slightly pubescent, and the abdomen very long, and tufted in the males. The Caterpillars are rather elongate, but not attenuated towards the head. The Chrysalides are of various colours. There are two British species.

Chloroclysta miata (the Autumn Green Carpet, No. 19) is a widely distributed insect. The Caterpillar, which is described as green, with two projecting points upon the last segment, feeds on Alder, Oak, and Birch. The perfect insect appears in September. Brighton, Bristol, York, and Tenterden are mentioned as localities in which it has been recently taken in abundance—and Edinburgh and Glasgow as places where it has been seen more sparingly.

The other species, *C. psittacata* (the Red Green Carpet), may be distinguished by the much darker green of the fore wings, which have also interrupted cross bands of white; and the hind wings are darkish brown, with paler bands.


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PLATE XLI.

No. 1—The May High-flyer (*Hydriomena impluviata*).
No. 2.—The Caterpillar of the May High-flyer.
No 3.—The Dark Marbled Carpet (*Polyphasia immanata*).
No. 4.—Juniper Carpet (*Thera Juniperata*).
No. 5.—The Winter Moth (*Cheimatobia brumata*).
No. 5½.—The Female of the Winter Moth.
No. 6.—The November Moth (*Oporabia dilutata*).
No. 7.—The Brindle-barred Yellow (*Acasis viretata*).
No. 8.—The Early Tooth-striped (*Lobophora lobulata*).
No. 9.—The Caterpillar of the Early Tooth-striped.
No. 10.—Beautiful Pug (*Eupithecia Linariata*).
No. 11.—The Caterpillar of the Beautiful Pug.
No. 12.—The Marbled Pug (*Eupithecia irriguata*).

THE present Plate contains the remainder of the genera contained in the fourteenth Sub-Family of *Geometridæ*—the *Cidaridi*—the first portion of which was included in Plate XL.

The genus *Hydriomena*. This is the genus *Ypsipetes* of Stephens, Hübner's name *Hydriomena* having been recently adopted on account of its priority of date. The insects assigned to it have the antennæ simple in both sexes. The abdomen is rather stout; the wings are of large proportion, and have greenish markings, with variegated fringes; the hind wings are silky, and nearly without markings. The insects have a peculiar kind of flight, generally at a considerable height, from which habit they are popularly known as High-flyers. The Caterpillars are rather short, with lateral stripes; and they feed on the foliage of trees or shrubs. The Chrysalis is formed among leaves. There are three British species.

Hydriomena impluviata (the May High-flyer, No. 1). This species is very variable, both in the strength and distinctness of its markings; but their character may be easily recognised in the palest as well as in the most strongly-marked specimens. The Caterpillar (No. 2) feeds upon the foliage of Birch and Hazel. The moth appears in May, towards the end of the month. It is found in the woods of Kent, flying at evening in damp places; but is said to be more abundant in the north. It has recently been taken in plenty near Manchester, in the Cotswold Hills, at Halton in Buckinghamshire, and other places.

The other species are *H. elutata* (the July High-flyer), which may be easily recognised by the greater irregularity of its transverse bands, which approach, almost, to a rather general mottling of greenish tone, which varies very much in different individuals; a small variety having the markings much more brown in colour, and of a dusky effect from their general blending. *H. ruberata*, the third species, was by some considered a variety of *H. impluviata;* it is, however, now considered a distinct species. It is greenish gray in tone, having a broadish dark band above and below the centre of the front wings, which are tinged with red.

The genus *Polyphasia*. The insects classed by Stephens in this genus being exceedingly variable, were formerly divided into eight distinct species, but these are now reduced to two, which are by some authors placed in the genus *Cidaria*. The insects retained in the genus have the antennæ simple in both sexes. The Caterpillars are slender, and have short tubercles on the terminal segment. The Chrysalides are sometimes variegated in colour.

Polyphasia immanata (the Dark Marbled Carpet, No. 3). This variable insect is common everywhere, though some of the varieties were once deemed rare. The *P. marmorata* and *P. amœnata* of former authors were varieties of this species. The Caterpillar still remains undescribed. The perfect insect appears in July and September.

The other species, *P. Russata*, with its varieties, may be distinguished generally by having the central portion of the anterior wings light, or traversed by narrow bands, instead of having a broad dark central band as in the former species. *P. Russata* was formerly distinguished as *P. centum-notata*, and its varieties were made *P. concinnata*, *P. saturata*, *P. perfuscata*, and *P. comma-notata*, &c. The typical *P. Russata* is abundant everywhere. The larva is described as yellowish green, with a dorsal line darker, and getting pinkish towards the tail.

The genus *Thera*. This is not a very well defined genus, the males of one of the species assigned to it having distinctly pectinated antennæ, while others have them simple in both sexes, or only slightly pubescent. The abdomen is rather long, and tufted in the males. The wings are not denticulated at the fringed edge. The Caterpillars are smooth and of rather long proportion; they feed generally upon the foliage of the Fir or Juniper. The Chrysalides are formed in a silken web among leaves.

Thera Juniperata (the Juniper Carpet, No. 4). This pretty species is not very abundant, but may often be taken just after dark in woody situations where the Juniper abounds, in the southern and eastern counties. The Caterpillar is apple-green, whitish on the back, and getting darker at the sides. It has a broad line of pale lemon colour at each side of the back, and a purplish line, edged with white, at the sides. It feeds on the Juniper; and the perfect insect appears late in the autumn. It has been recently captured at Sanderstead, Mickleham, and in the neighbourhood of Glasgow.

The following are the other species: *T. variata* (the Gray Carpet) is pale brown, with a broad central band of dark brown, edged with a line of the same colour paler than the ground. This species is abundant in fir-woods in May. *T. simulata* (the Shaded Broad-bar) is much lighter coloured, and more faintly marked than the last described, and has the antennæ of the males pectinated. *T. firmaria* (the Pine Carpet) is pale gray, with a rather ochreous blotch at the base of the front wings, the broad band being of ochreous brown. The last species is very plentiful near Manchester, abounding in Fir-woods.

The genus *Cheimatobia*. This genus is well marked by the nearly apterous character of the females. In the males the wings are of ample dimensions, though of somewhat narrow proportion; while in the females they are extremely short, and in fact merely rudimentary, not being fitted for flying. It would seem to be a more natural arrangement to place the whole of the species in which this singular peculiarity exists in consecutive genera, so as to form a distinct group or sub-family; but the difference of character in other respects, especially in the preparatory stages, appears to render such an arrangement very difficult. The antennæ of the males are slightly pubescent, and in one species bipectinated. The Caterpillars are slender, rather attenuated at the extremities; they feed enclosed in a leaf till the time of change, when they enter the earth in order to pass into the pupa stage, the Chrysalis being formed in a slight cocoon. The moths generally appear in mid-winter.

Cheimatobia Brumata (the Winter Moth, No. 5). This pretty moth is very common. The female (No. 5½) is brown, with very short rudimental wings. The Caterpillar is described by M. Guénée as being of a pale yellowish green, shaded with a blackish tone; the stripes are of yellowish white, and the head is green. It feeds on the foliage of various trees. The perfect insect appears in mid-winter, and is common everywhere, flitting about the leafless hedges in search of the females, which are deprived of the power of flight by the rudimental character of their small wings.

The two other species are the following: *C. rupicapraria* (the Early Moth) may be easily distinguished by the pinkish brown tone of the anterior wings, which have a rather distinct band across the centre of a darker tone, bordered with lighter. *C. Boreata* (the Northern Winter Moth) is pale gray, with a slight ochreous tinge, and a slightly darker central band faintly bordered with lighter. It is found in Birch-woods in September.

The genus *Oporabia*. The affinity of this genus to the last described is shown in the wings of the female, which, though not merely rudimental, are yet much smaller than those of the male. The antennæ of the male are slightly pubescent. The Caterpillars are short, and not attenuated at either extremity. They are generally of a full velvety green, and feed upon the foliage of several trees, burrowing in the ground to undergo the change to the chrysalis state.

Oporabia dilutata (the November Moth, No. 6) is a very common insect. The Caterpillar is described by M. Guénée as being green above and bluish white underneath, with a more or less distinct dorsal line of

reddish brown. It feeds on Oak, Elm, &c., and the moth appears in November. It is abundant everywhere. There is a pale variety, which has some of the darker marks joined, so as to give it a pied appearance much more striking than that of ordinary specimens ; and other varieties are entirely of the colour of the darker markings.

The other three species are, *O. neglectata*, by many entomologists deemed a mere variety of the preceding ; *O. autumnaria*, more glossy than *O. dilutata*, with the front wings rather more pointed and smaller ; and *O. filigrammaria*, the wings of which are pale gray, with several transverse wavy lines forming a broad central band, which is pale in the centre. Both *O. autumnaria* and *O. filigrammaria* are northern species.

The genus *Acasis*, of Duponchel, contains but one British species, which has been detached from Mr. Stephens' genus *Lobophora*, on account of the existence of minute characters which appear to warrant the new location. The insect is, however, still retained in the genus *Lobophora* by Mr. Stainton and many other entomologists.

Acasis viretata (the Brindle-barred Yellow, No. 7). This pretty insect may be considered rare. The Caterpillar, according to Hübner, is dull yellow, spotted with orange on the back. It feeds on the foliage of the Privet ; and the perfect insect appears in May. It has been recently taken at Lewes, Lyndhurst, Cambridge, &c.

The genus *Lobophora*. This genus includes the species popularly known as the *Seraphims*. The antennæ of the males are simple, or nearly so ; the palpi are short and bent abruptly upwards. The hind wings of the male have a raised lobe at the base, fringed at the edge, which in some of the species is very conspicuous. The Caterpillars are smooth, with the head flat and the tail slightly bifid. They feed on various trees. The Chrysalis is subterranean.

Lobophora lobulata (the Early Tooth-striped, No. 8). This species has been selected for illustration as best exhibiting the lobe of the hind wings. The Caterpillar (No. 9) feeds on the Sallow in August, and the perfect insect appears in the following month. It has been recently taken in abundance at Manchester, York, and in districts much farther north. It is generally found on palings and the trunks of trees.

The other species are : *L. polycommata* (the Barred Tooth-striped), which has the front wings grayish, with the basal blotch rather darker. This is a very local insect. *L. hexaptera* (the Seraphim), which has the front wings of a pale ochreous tone, with transverse cloudy bands of pale blackish, powdered with darker specks. *L. sexalisata* (the Small Seraphim), which is a much smaller and more fragile insect than any of the other species, and is of a pale buff tone, with delicate, but distinct, bands of a grayish colour.

The genus *Eupithecia* is one of the most extensive of the great family of *Geometridæ*. It contains a large proportion of the pretty class of Moths popularly known as Pugs. One of the general characters of this genus is the uniformly small size of the insects assigned to it. The antennæ are alike in both sexes, or those of the males are only slightly pubescent. The abdomen is generally crested. The front wings are narrow, and the hind wings small in proportion to the front. The Caterpillars are short and stiff, and the back has generally a series of strongly defined markings. They often feed on the flowers or seed-vessels of plants rather than on the foliage. The Chrysalis is slender and very pointed. There are thirty-seven described species, and, with the one newly named by Mr. Doubleday, thirty-eight.

Eupithecia linariata (the Beautiful Pug, No. 10). This beautiful little insect is still rather rare, though several new localities have been discovered in which it is found in some plenty. The Caterpillar (No. 11) feeds in spring upon the flowers or on the seed-vessels of the common Toadflax (*Linaria vulgaris*), and the moth appears in the following June and July.

Eupithecia irriguata (the Marbled Pug, No. 12). This is another very pretty species, the ordinary chaste brown tones of which are sometimes beautifully heightened, especially in continental specimens, by a flush of pink. The Caterpillar is at present unknown. This is a rare species, but it has been recently taken at Lyndhurst and one or two other places, besides the localities in the mountains of South Wales where it was first observed.

Eupithecia viminata, the species recently named by Mr. Doubleday, is rather obscure in its markings, but much sought just now by collectors, both on account of its rarity, and as being decidedly a well-defined new species.

The other species are—*E. togata*, *E. pulchellata*, *E. rectangulata*, *E. coronata*, *E. debiliata*, *E. pumilata*, *E. rufifasciata*, *E. pusillata*, *E. Begrandaria*, *E. plumbeolata*, *E. palustraria*, *E. satyrata*, *E. callunaria*, *E. subumbrata*, *E. subnotata*, *E. castigata*, *E. subfasciata*, *E. austerata*, *E. Sobrinata*, *E. exiguata*, *E. abbreviata*, *E. innotata*, *E. lanceolaria*, *E. tenuiata*, *E. minutata*, *E. elongata*, *E. indigata*, *E. nanata*, *E. piperata*, *E. centaureata*, *E. succenturiata*, *E. cognata*, *E. subfulvata*, *E. consignata*, *E. venosata*. It is manifestly impossible in a popular work of the restricted extent to which this work is limited to do more than thus give a mere list of the names of the un-illustrated species of a genus so extensive as *Eupithecia*. This pretty group would, however, form an interesting study to a beginner, especially in seeking for the larvæ, which are at present but little known.


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PLATE XLII.

No. 1.—The Horse Chestnut (*Pachycnemia Hippocastanaria*).
No. 2.—The Streak (*Eucestia Spartiata*).
No. 3.—The Caterpillar of the Streak.
No. 4.—The Small Waved Umber (*Phibalapteryx Vitalbata*).
No. 5.—The Narrow-barred Carpet (*Plemyria gemmata*).
No. 6.—The Dark Umber (*Philereme Rhamnata*).
No. 7.—The Broom Seallop (*Schidax Sparsaria*).
No. 8.—The Tissue (*Triphosa dubitata*).
No. 8½.—The Searee Tissue (*T. certata*).
No. 9.—The Yellow Shell (*Camptogramma bilineata*).
No. 10.—The Seallop Shell (*Calocalpe undulata*).
No. 11.—The Blaek-veined (*Siona dealbata*).
No. 12.—The Snowy (*Gypsochroa niveata*).

THE fifteenth sub-family of the *Geometridæ* is that of the *Chesiadi*, containing the nine genera illustrated in the present Plate.

The genus *Pachycnemia*. The insects assigned to this genus have the antennæ slightly thickened and serrated in the males, and simple in the females. The palpi project, in the form of a short straight beak. The abdomen is slender and rather long. The larva is not well known. There is but one British species.

Pachycnemia Hippocastanaria (the Horse Chestnut, No. 1). This inconspicuous insect appears throughout the summer, there being probably several broods from March to September. It is found in heathy districts, especially the open places in the New Forest, about July. The larva has not been accurately described.

The genus *Eucestia* (the *Chesias* of Treitschke). In this genus the antennæ are simple in both sexes. The palpi are long, scaly and close together, like a beak. The abdomen is long and rather stout; the wings are long, narrow, glossy, and rather lanceolate in form; and when at rest, they descend each way from the ridge over the back like a roof. The Caterpillars are slender and smooth. The Chrysalides have the ventral protuberance rather prominent. There are two British species.

Eucestia Spartiata (the Streak). This remarkably distinct species receives its popular name from the white streak which extends from the points of the front wings to near the base. The Caterpillar (No. 2) feeds on the common Broom, and the perfect insect appears in October, in places where that plant is abundant.

The other species is *E. obliquata* (the Chevron) which has the same lancet-formed wings, but is easily distinguished by the absence of the white streak, and the more regular transverse bands, especially the broad dark one beyond the centre, near the external edge.

The genus *Phibalapteryx*. The insects assigned to this genus have the antennæ simple in both sexes. The body has generally a double row of black spots, and sometimes a black line. The front wings have the tip somewhat prolonged and in some species rather hooked. The Caterpillars are very long and slender and rather attenuated towards the head. The Chrysalis is formed in the earth. There are four British species.

Phibalapteryx Vitalbata (the Small Waved Umber, No. 4). This clearly marked species, with its transverse wave of rich umber running from the anterior tip of the front wing to the inner side of the base, is by no means a common insect. The Caterpillar is described by M. Guénée as reddish gray marbled with black, with black lines on the back, and a flesh-coloured line at the sides. It feeds on the

Clematis vitalba, from which its specific name is derived. The perfect insect appears both in June and October. It has been taken in plenty at Bristol and Cambridge, and more sparingly in other places.

There are three other species: *P. tersata* (the Fern) is rather larger and of more dusky brown, with the transverse bands passing evenly across the wings. *P. lignata* is a smaller and rather more delicately formed insect, which may be readily distinguished by two short but strong stripes, and three slenderer but longer streaks on the hind wings. *P. polygrammata* (the Many-lined) is grayish in tone, with rather irregular brown bands, one of them running transversely and terminating towards the centre of the wing; and within the dark bands are others of a whitish tone.

The genus *Plemyria* of Hübner has been adopted for the purpose of locating more appropriately two British species, removed from the last described genus. The insects assigned to the genus under description have the antennæ simple in both sexes; but the bodies are without the spots which distinguish those retained in the last.

P. gemmata (the Narrow-barred Carpet, No. 5), formerly *Phibalapteryx angusta*, is an inconspicuous insect, and was supposed by some collectors to be an imported insect, as the specimens found in the State of Georgia in North America are identical with those considered British. It has however occurred recently at Brighton, Bristol, in the Isle of Wight, and other places. The Caterpillar is unknown.

The second species, *P. lapidata*, closely resembles the last described, but has the wings rather more pointed and the waved transverse lines more distinct. It is very rare, having only been taken at Rannoch in Perthshire.

The genus *Philereme* of Hübner is now made to contain the insects assigned by Stephens to his own genus *Scotosia*, in consequence of the priority claimed for the term adopted by the German Entomologist. The insects have the antennæ simple in both sexes, the abdomen of the male is tufted, the wings are slightly dentate, and in some species the hind wings have a tuft of scales near the terminal angle. The Caterpillars are thick, and feed at first in folded leaves. The Chrysalis is formed in the earth. There are two British species.

Philereme Rhamnata (the Dark Umber, No. 6), is a much larger insect than any yet described in this sub-family. The Caterpillar, which is described by Hübner as variable, is usually dark brown on the back, and white, speckled with brown, at the sides; or green, with a white line at the side, edged below with dark reddish brown. It feeds on the foliage of the Buckthorn. The moth appears at the end of May, and is found in woods; but is not a common species. It has been taken recently near Brighton, Bristol, Lewes, York, and other places.

The genus *Schidax*. This genus of Hübner's has been adopted for the reception of a single species, lately located in the genus *Scotosia* as *Scotosia Sparsaria*. The antennæ of the male are simple; the body is rather longer than the wings; the palpi extend beyond the head; and the hind wings slightly dentate. The Caterpillar has not been described.

S. Sparsaria (the Broom Scallop, No. 7) is an inconspicuous insect, not likely to be much sought except by thorough Lepidopterists, especially as it is very rare, having only been taken in the New Forest and near Cambridge. It appears about June.

The genus *Triphosa*. The insects assigned to this genus have the antennæ simple in both sexes. The palpi form a short beak. The wings are broad, and generally strongly marked with transverse bands, which are conspicuously sinuated or sharply dentated. The Caterpillars are robust, and marked with pale stripes.

Triphosa dubitata (the Tissue, No. 8), is a rather large and handsome insect. The Caterpillar feeds on Buckthorn, and is described by M. Guénée as being green with white lines, and a yellow line at the side. There are two broods, the Moth appearing both in May and August. It frequents gardens, and is a common and widely-distributed species.

The other species, *T. certata* (the Scarce Tissue, No. 8½), may be known by its rather smaller size, and deeper and redder colour, especially in the hind wings, and the lighter band of ochreous tone in the front wings.

The genus *Camptogramma*. The insects assigned to this genus have the antennæ simple in both sexes. The wings are broad, like those of the last genus, and have similar markings; but their surface is entirely without

gloss, and the ground colour is generally dull orange. The tips of the front wings are slighly falcate, and the margin of the hinder pair rather dentate. The Caterpillar is not attenuated towards the extremities, though the head is small. The Chrysalis is formed in the earth. There is only one British species.

C. bilineata (the Yellow Shell, No. 9), is one of the commonest of the moths popularly known as the Carpets. The Caterpillar, as described by Freyer, is greenish white, with a dark dorsal line, and white lines at the sides. It feeds on grass and other plants. It is common everywhere about the end of June.

The genus *Calocalpe*—the *Eucosmia of Stephens.* The insects in this genus agree with those of the two preceding genera in the denticulation of the hind wings; but the palpi are not arranged in a beak-like form, and the hind wings of the males have a tuft of scaly hair on the inner margin.

C. undulata (the Scallop Shell, No. 10). This elegantly marked insect, the regularly undulating transverse stripes of which have suggested its specific name, is by no means common. The Caterpillar, as described by Treitschke, is blackish gray, with paler lines on the back, and a broader pale line at the sides. It feeds on the Sallow, and the Moth appears in September and October. It has been recently taken at Oxford, Plymouth, York, and several other places, but only sparingly. This is the only British species.

The sixteenth sub-family of the *Geometridæ* is that of the *Sionidi*, which contains two genera, *Siona* and *Gypsochroa.*

The genus *Siona* of Duponchel is nearly identical with the *Idaëa* of Ochsenheimer and Stephens. The insects assigned to it have the antennæ simple in both sexes; the palpi short and slender, but appearing beyond the head. The tips of the wings are not acute, and are destitute of markings. The only British species has the wings white without variation, except the dark lines of the veins.

Siona dealbata (the Black-vein, No. 11). This singular insect forms the type of a very distinct genus, as may be seen by its generic character, and by the form of the wings, which are very distinct from those of the genera which precede and follow it. It is taken in July, chiefly in woods in the south of England; but it is rather scarce.

The genus *Gypsochroa.* The insects assigned to this genus have the antennæ simple in both sexes; the abdomen long; the fore wings oblong, the tip narrow, and they are without distinct markings. The hind wings are short and narrow. The Caterpillar is unknown. There is only one British species.

G. niveata (the Snowy, No. 12) is at present a very rare insect, only two places being cited for its capture. The representation in the present plate is taken from Hübner's figure, as the only specimen I could get access to consisted only of a pair of mutilated wings, and part of the body.


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PLATE XLIII.

No. 1—The Large Magpie (*Abraxas Grossulariata*).
No. 2.—The Caterpillar of the Large Magpie.
No. 3.—The Chrysalis of the Large Magpie.
No. 4.—The Speckled Yellow (*Venilia maculata*).
No. 5.—The Clouded Silver (*Corycia punctata*).
No. 6.—The Caterpillar of the Clouded Silver.
No. 7.—The Argent and Sable (*Melanippe hastata*).
No. 8.—The Caterpillar of the Argent and Sable.
No. 9.—The Small Argent and Sable (*Melanthia tristata*).
No. 10.—The Caterpillar of the Small Argent and Sable.
No. 11.—The Beautiful Carpet (*Mesoleuca albicillata*).
No. 12.—The Sandy Carpet (*Emmelesia decolorata*).
No. 13.—The Least Carpet (*Cosmorhoe rusticata*).
No. 14.—The Purple-bordered Gold (*Hyria auroralis*).
No. 15.—The Drab Looper (*Minoa Euphorbiata*).
No. 16.—The Caterpillar of the Drab Looper.
No. 17.—The Chimney Sweep (*Odezia Chærophyllata*).

The seventeenth Sub-Family of the *Geometridæ* is that of the *Zerenidi*, the insects assigned to which have the antennæ of the males thickened, but not pectinated. The abdomen is generally spotted with black, and the wings broad and white, with black or orange-coloured spots. The larva are not attenuated, and are generally marked in a manner somewhat analogous to the perfect insect. The Chrysalides are short and black, and sometimes ringed with yellow at the joints. There are three genera, *Abraxas*, *Venilia* and *Corycia*.

The genus *Abraxas*. The insects assigned to this genus have all a strong family resemblance, and belong to the Currant-moth tribe. The antennæ are short and simple in both sexes, but slightly thickened in the males. The wings are broad, of slight and delicate texture, and silvery white variegated with dots or patches of black, gray, or orange. The bodies are generally orange, spotted with black. The Caterpillars are regular loopers, but of thick proportion, and not attenuated at either extremity. The Chrysalides are sometimes enclosed in a slight silken cocoon, or attached to a branch by a slight net-work of silken web.

Abraxas Grossulariata (the Large Magpie, or Currant-moth, No. 1). This conspicuous insect is exceedingly variable in its markings, but yet from its general character it is easily recognised. I have seen specimens in which the black markings have almost entirely covered the wings and obscured both the orange spots and the white ground; and have found others in which the markings, both black and orange, have been so faint as to leave the wings nearly white; and yet in these extremes the family character of the moth is so unmistakeable, that even a very young entomologist would not mistake such specimens for any other species. The Caterpillar (No. 2) feeds on the foliage of the Currant and other fruit trees in May and June. The Chrysalis (No. 3) is prettily ringed with yellow. The perfect moth appears in July and August. It is common everywhere.

There are two other species. *A. pantaria* is considerably smaller than the preceding. The white wings are only varied by one indistinct brownish-orange patch at the inner angle of the anterior wings, and a few similar marks on the hind wings. This is a very rare species, only occasionally found in the northern counties, and it is doubtful even whether it be British. *A. Almata* is of intermediate size, and is marked in a somewhat similar manner to *A. Grossulariata*, but much more faintly, with brown, orange, and gray.

The genus *Venilia*. The only British species belonging to this genus is assigned by some authors to a widely different position in the modern arrangement, but in many respects it appears to suit its present location. The chief characters of the insects assigned to this genus are, antennæ slightly pubescent beneath, in the males;

the wings rather indented below the tip, and forming a triangle when in repose. The larvæ are somewhat more elongated than those of the last genus. The Chrysalis is rather short, and subterranean.

Venilia maculata (the Speckled Yellow, No. 4). The Caterpillar is described by M. Guénée as green, with a darker dorsal line between two white ones, and with a white line at the sides. It feeds on various Nettles, and the perfect insect appears in May and June. It is common in woods. Many places, from Bristol to Tenterden, are cited by entomologists as localities in which it has recently been noticed in great abundance.

The genus *Corycia.* The characters of this genus are, antennæ simple in both sexes; wings rounded, and of a satiny white, marked with a few irregular grayish or brownish spots. The Caterpillar is rather thick, and does not burrow to undergo its metamorphosis. There are two British species.

Corycia punctata (the Clouded Silver, No. 5). The Caterpillar (No. 6) feeds on the Sloe and wild Cherry in the autumn, the moth appearing in the following May and June. It was formerly considered rare, but has recently been taken at Manchester in great abundance, and at Brighton, Plymouth, and the Cotswold district, in some plenty.

The only other species, *C. taminata* (the White-pinion Spotted), may be easily distinguished by the absence of any markings, except two brownish irregular spots at the front of the anterior wings.

The eighteenth Sub-Family of *Geometridæ* is that of the *Melanthidi*, containing the genera *Melanippe*, *Melanthia*, *Mesoleuca*, *Emmelesia*, *Cosmorhoe*, *Hyria*, *Minoa*, and *Odezia.*

The genus *Melanippe.* The insects assigned to this genus have the antennæ simple in both sexes; and the wings large and strongly marked, having generally a broad irregular band of white traversing all four wings. The Caterpillars are rather short, and slightly attenuated towards the head, and the Chrysalis is formed in an earthen cocoon. There is only one British species in the system I am following, but in other arrangements the genus is made to comprise eight or nine.

Melanippe hastata (the Argent and Sable, No. 7). The Caterpillars (No. 8) of this pretty insect feed on Birch, and several are generally found together. The moth appears in August. It is rather rare, but widely distributed, and more common towards the North, having been taken recently at Manchester, York, and several places in Scotland, especially Dunoon, Arran, and Ben Lomond.

The genus *Melanthia*, in the system I am following, is made to comprise four species, more or less closely allied to the last genus, and in some arrangements included in it. They are, however, smaller, though more robust, and present several minute distinctive characters which it would be impossible to detail in a work of strictly popular character.

Melanthia tristata (the Small Argent and Sable, No. 9) may be considered the type of this genus, though it was formerly considered by some authors merely a variety of *Melanippe hastata.* The Caterpillar (No. 10) feeds upon the Bed-straws in August and September, and the moth appears in the following May and June. It is a rare species in many districts, but least so in the North, having been recently taken in the neighbourhood of Edinburgh in great abundance. The other species are *M. Alchemillata* (the Common Carpet), *M. rivata* (the Wood Carpet), and *M. amniculata* (the Sharp-angled Carpet). All three belong to the 'Carpet' group, and are small cream-coloured moths, with many bands and streaks of different shades of brown, but none of the species are marked with black except the one figured.

The genus *Mesoleuca.* This genus of Hübner's is the same as the genus *Zerene* of Treitschke. The antennæ are simple and very slender in both sexes. The wings are large, and form a triangle when at rest. The Caterpillars are slender and have the head rather depressed. There are four British species.

Mesoleuca albicillata (the Beautiful Carpet, No. 11). The Caterpillar of this pretty species, as described by Hübner, is green, with triangular reddish spots on the back from the fourth to the tenth segment, and having a white line at the side. It feeds on Raspberry and Bramble in August and September. The moth appears in the following June and July, in woods, and is very widely dispersed.

The other species are—*M. adustata* (the Scorched Carpet), easily distinguished by the deepened colour of the wings, which approach a pale ochre. *M. procellata* (the Chalk Carpet), which is grayer in tone, and has the broad dark border at the fringe of the anterior wings, interrupted at the external edge by a conspicuous patch of the ground colour: and *A. rubiginata* (the Blue Bordered Carpet), which is much smaller in size than the

other species, and the ground colour of the wings is of a very pale delicate slate colour, the hind wings being of the same tone, except the brown border.

The genus *Emmelesia.* In this genus the antennæ are simple in both sexes. The wings are rather thin and rounded, and the fore wings marked with several wavy bands and lines. The caterpillars are slender, and feed on herbaceous plants. The chrysalis is enclosed in an earthen cocoon.

Emmelesia decolorata (the Sandy Carpet). The larva of this species is undescribed, but it is known to feed on the flowers of Lychnis diurna. The moth appears in June and July, and is very common in hedges, lanes, and woods.

The other species are—*E. rivulata* (the Rivulet), considerably smaller than the last. The wings are pale brown, and distinguished by a meandering band or rivulet of white, with a dark line in the middle, running across the front wings, but less distinctly across the hinder pair; also, *Emmelesia hydrata* (the Small Rivulet), is much less than the preceding, and has a clear band of white running across all four wings, which are pale brown. *Emmelesia albulata* (the Grass Rivulet), is of cool buff colour, with a broad and a narrow band of light cream colour running across the front wings, and a large space of cream colour in the hind wings, leaving a buff border. There are also *E. blandiata*, *E. ericitata*, *E. tæniata*, and *E. bifasciata*, all more or less of similar character.

The genus *Cosmorhoe.* The insects assigned to this genus are of very small size; they have the antennæ pubescent or slightly ciliated in the male, which distinguish them from those of the surrounding genera. The caterpillars are slender, and slightly thickened towards the tail. The chrysalis is subterranean.

Cosmorhoe rusticata (the Least Carpet, No. 13). This species was formerly included in the *Emmelesiæ*, and is now placed by some authors in the genus *Acidalia;* indeed, the whole of the last Sub-Families of *Geometridæ* are at present in a very unsettled state, and await some Entomological Cuvier to determine their definite location. The larva is unknown, and the perfect insect, which appears in July, is rather rare. It has been recently taken in the Isle of Portland, and at North Fleet, near Gravesend.

The genus *Hyria.* In this genus the antennæ of the male are ciliated, and furnished with long slender bristles on each side. The wings, when in repose, form a flattened triangle. The Caterpillars are long and vermiform; and are rather stiff, and slightly flattened above. The Chrysalides are subterranean. There is but one British genus.

Hyria Auroralis (the Purple-bordered Gold, No. 14). The Caterpillar, according to M. Guénée, and the beautiful figure of Lyonnet, is tawny gray, with a series of paler marks along the back, and paler lines at the sides. It feeds on the Plantain in June, and the perfect moth appears in July. Ordinary specimens are pale gold colour, with a purplish band running across all four wings; but there are varieties in which the gold colour has a rich gloss of red, leaving a spot of the yellow colour in the centre of each wing. The females are much rarer than the males. It has been often taken in different parts of Surrey; and has been recently noticed at Lyndhurst, and in some plenty at Cambridge and Manchester.

The genus *Minoa.* The insects assigned to this genus have the antennæ of the males slightly pubescent. The body slender, the wings silky and without markings. The Caterpillars are thick, with numerous short hairs. The Chrysalides are formed in an earthen cocoon. There is but one British species.

Minoa Euphorbiata (the Drab Looper, No. 15). The Caterpillar of this species (No. 16) feeds on several species of *Euphorbia* in October, and the moth appears at the end of the following May, or early in June. It is not a very rare species in woody districts. Brighton, Halton, Stowmarket, Oxford, &c. &c., are cited as places where it has been recently taken.

The genus *Odezia.* The insects assigned to this genus have the antennæ of the males simple. The wings are rather large and rounded, and are carried erect in repose. The Caterpillars are slender, of a velvety texture, and striped. The Chrysalis is formed in a slight cocoon. There is but one British species.

Odezia Chærophyllata (the Chimney-Sweeper, No. 17). The dark green and velvety caterpillar of this moth feeds on *Chærophyllum sylvestre* in May and July, and the moth appears in June and the following months. It is found in great plenty in open places in woods in all parts of the country. It has been recently taken in abundance at Kingsbury (Middlesex), Manchester, and other places.


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PLATE XLIV.

No. 1.—The Clouded Border (*Lomaspilis marginata*).
No. 2.—The Caterpillar of the Clouded Border.
No. 3.—The Lace Border (*Ptycopoda ornata*).
No. 4.—The Tawny Wave (*Emmiltis rubricata*).
No. 5.—The Dark Cream Wave (*Acidalia marginepunctata*).
No. 6.—The Latticed Heath (*Strenia clathrata*).
No. 7.—The Dingy Shell (*Euchœca separata*).
No. 8.—Blomer's Rivulet (*Hydrelia Blomeri*).
No. 9.—The Small Yellow Wave (*Asthena luteata*).
No. 10.—The Small Grass Emerald (*Nemoria viridata*).
No. 11.—The Common Emerald (*Thalera Æstivaria*).
No. 12.—The Caterpillar of the Common Wave.
No. 13.—The Small Blood-vein (*Timandra imitaria*).
No. 14.—The Peacock (*Macaria notata*).
No. 15.—The Caterpillar of the Peacock.
No. 16.—The Tawny-barred Angle (*Macaria liturata*).
No. 17.—The Caterpillar of the Tawny-barred Angle.
No. 18.—The Small Scallop (*Ania emarginata*).
No. 19.—The Beautiful Hook-tip (*Ennomos flexula*).

The eighteenth Sub-Family of *Geometridæ* is that of the *Acidalidi*, containing eight British genera. The antennæ of the males in all the genera are pubescent, the body stout, and the wings of moderate size. The Caterpillars are short, stiff, without humps, and having distinct lines. The Chrysalides are subterranean.

The first genus is *Lomaspilis*, exhibiting all the leading characteristics above described.

Lomaspilis marginata (the Clouded Border, No. 1), is the *Pœcilophasia marginata* of Stephens. The Caterpillar of this species (No. 2) feeds on the Sallow in June and October, the moth appearing in May and July. It is abundant everywhere.

The genus *Ptycopoda*. The insects in this genus have the antennæ very slender, and ciliated beneath in the males. The wings when at rest are extended horizontally. The hind tibiæ are furnished with a long brush of hair in the males, and from the structure of the feet Mr. Stephens divided the genus into two sections. The Caterpillars conceal themselves by day, and the Chrysalides are subterranean.

Ptycopoda ornata (the Lace Border, No. 3). The Caterpillar of this elegant species is described by Freyer as being of grayish colour, with dark reddish lines on the back, and variegated at the sides with short irregular dark streaks. It feeds on different species of Thyme in April and August, and the moth appears in June and July. It is far from uncommon in chalky places in Kent and other counties. It has recently been taken in extraordinary abundance at Box-hill. There are five other species.

P. Reversata (the Fan-footed Wave) is smaller than the preceding, of a pale ochreous tone, bordered with deeper. *P. bisetata* (the Treble Brown-spot) is somewhat larger than the last, but of the same colour, the dark band leaving a clear space next the edge. *P. scutulata*, *P. Immutaria*, and *P. virgularia*, are all of similar character, but none of them have the lacy effect of the border of *P. ornata;* perhaps, however, *A. virgularia*, with its wings dusted with dark gray, has a somewhat lacy appearance, but the brownish colour is unfavourable to the effect.

The genus *Emmiltis*. The single British species now assigned to the genus *Emmiltis* of Hübner, has been recently separated from Mr. Stephens' genus *Ptycopoda*. The generic distinctions which have led to this change of location are too minute to require description in a popular work.

Emmiltis rubricata (the Tawny Wave, No. 4) is placed by some entomologists in the genus *Acidalia*. The

Caterpillar of this species is unknown, but the perfect moth appears in August, being, however, very rare. Mr. Stephens took a specimen at the North Foreland Meadow, near Dover; and it has been taken more recently near York.

The genus *Acidalia.* The British species assigned to this genus by Mr. Stephens, were separated by him from the preceding genus principally on account of differences in the structure of the feet. Their more elongated wings, free from clouding at the edges, forms, perhaps, a more obvious distinction. Thirteen species were assigned by this mode of separation to the genus *Acidalia* of Treitschke. Some English entomologists bring the number up to twenty-six by adding several species from other genera.

Acidalia ossecata (the Dark Cream Wave, No. 5). The larva of this pretty little species is unknown, but the perfect moth is very common towards the end of June, in woods and old hedge-rows.

The other species are the following: *A. marginepunctata* (the Dotted-bordered Cream Wave) is much like the preceding, but dusted with specks, and having some small black dots on the apical margin. *A. obsoletaria* (the Obscure Wave) is very dusky, and its marks imperfectly defined, but otherwise resembling the last. *A. Perochraria* (the Bright Wave) has the wings pale yellowish, with four brownish yellow bands on the fore wings, and three on the hind wings. It is very rare. *A. Holosericearia* (the Silky Wave) is a new species. *A. subsericeata* (the Satin Wave) is cream colour, shaded and banded with ochreous tint. There are also *A. inornata*, *A. degeneraria*, *A. aversata*, *A. remutata*, *A. Cæspitaria*, *A. fumata*, and *A. immorata*, all more or less resembling each other in general character, *A. aversata* being the largest and handsomest. It is pale brown, with the inner dark band shading off gradually to the body, and the two external bands very distinct, the whole being powdered with darker brown.

The genus *Strenia.* In this genus the antennæ are short and slender, those of the males being slightly pubescent. The front and hind wings have similar markings, and generally of a tawny colour. The Caterpillars are short, and flattened beneath, and have spots emitting hairs. The Chrysalis is subterranean. There is but one British species.

Strenia clathrata (the Latticed Heath, No. 6). The Caterpillar of this beautiful species is said to be pale-green, with two white lines edged with dark green along the back, and another similar line at the side, and a white line above the legs. It feeds on Medicago, the common Trefoil, and other plants, in October and May, and the perfect moth appears in June and July. It is found on all chalky soils, but more especially in Kent. Brighton, Bristol, Scarborough, and many other places are cited for its recent capture in some plenty—and at Cambridge it has appeared in very great abundance.

The genus *Euchœca.* The principal characters of this genus are, the antennæ of the males slightly pubescent, the wings entire and thick, and held erect when in repose. The hind wings slightly angular. The Caterpillars are short and rather attenuated in front. The Chrysalides are formed in a slight cocoon, on the ground. There is but one British species.

Euchœca beparata (the Dingy Shell). The Caterpillar of this species is yellowish-green, with a line of lemon-yellow at the back, and another at each side. It is also spotted with yellow. It feeds on the Alder and the common Birch in October, and the perfect moth appears in the following June and July. It is rather rare, but has often been taken in woods in Kent, Surrey, and Norfolk. It has been more recently taken in some plenty in the Cotswold district, and at Tenterden, and more sparingly in many widely distant localities.

The genus *Hydrelia.* The species assigned to this genus have the antennæ of the males pubescent—the body slender, the wings of delicate texture, and marked by several transverse wavy lines. The Caterpillars are thickest in the middle and much attenuated in front. The Chrysalis is formed between leaves or moss. There are only two species.

Hydrelia Blomeri (the Blomer Rivulet, No. 8). The Caterpillar of this species is unknown. The moth is found in June and July. It appears to be a northern species, having been taken at Castle Eden Dene—at Pickering, and near Preston. The other species *H. sylvata* (the Waved Carpet), is much like *Blomeri*, but has the bands of more equal breadth.

The genus *Asthena.* The characters of this genus very closely resemble those of *Hydrelia*, both the species of which are placed by some writers in the present genus, from which their truly generic differences are very slight,

if any, so that for convenience sake it would have been better to allow the two species about to be described, to be joined to the genus *Hydrelia*, which seems to have greater claim to them.

Asthena luteata (the Small Yellow Wave, No. 9.). The larva of this pretty little insect is unknown. The perfect moth appears in June, and is rather common. It has been recently taken in great abundance in the Cotswold district, at Halton—and in plenty at York, Brighton, and in many other widely distant localities.

The other species is *A. sylvata* (the Waved Carpet), easily distinguished from *luteata* by its gray colouring and more rounded wings, the markings being very similar.

The nineteenth Sub-Family of the *Geometridæ* is that of the *Timandridi*, containing six genera.

The genus *Nemoria.* In this genus the antennæ of the male are slightly ciliated, the body smooth, the wings small, and more or less tinged with green, and the hinder pair being slightly angulated. The Caterpillar is slender with the head bifid, and two low spines on the second segment. The Chrysalis is formed between leaves. There are two British species.

Nemoria viridata (the Small Grass Emerald). The Caterpillar of this pretty species is flesh-coloured, with a dark dorsal line, and feeds on Bramble and Hawthorn in October, the moth appearing in the following May and June. It was formerly taken in the New Forest, and considered rare. More recently it has been taken rather plentifully in the Lake district, at Lyndhurst, and near Lancaster.

The other species, *N. cloraria* (the Middle Grass Emerald), has been supposed to be British on the strength of a specimen captured by Mr. Stephens, but it is omitted in many British catalogues.

The genus *Thalera.* The insects assigned to this genus have the antennæ of the males ciliated, the abdomen slightly crested, the wings dull-green—the hind ones rather angulated and their fringes spotted. The larva is of long proportion, and rough. The Chrysalis is formed in a cocoon amongst leaves. The only British species in this genus was formerly placed in the same genus with the two preceding species, but has been separated and placed in Hübner's genus *Thalera*, on account of some of the characters just described.

Thalera Æstivaria (the Common Emerald, No. 11). The Caterpillar of this species (No. 12), feeds on the Oak and White-thorn, in May ; the moth appearing in June and July. It is a common species in woods ; and has recently been taken in great abundance at Stowmarket, Cambridge, Kingsbury, and in less profusion at Plymouth, Manchester, and many other places.

The genus *Timandra.* The insects assigned to this genus have the antennæ of the males ciliated like those of the last genus, but they differ in having the fore-wings more pointed, and traversed by bands—and being without the peculiar green tints which distinguish the species belonging to the preceding genus. There are three British species.

Timandra imitaria (the Small Blood Vein). This pretty species is placed by some entomologists in the genus *Acidalia.* The larva is unknown. The moth appears in July and August. It is a common and widely dispersed species ; Exeter, the Cotswold district, and many other places being cited for its recent capture in abundance. There are two other species, *T. exemptaria* (the Sub-angled Wave), and *T. emutaria* (the Dusky Wave).

The genus *Macaria.* In this genus the antennæ of the males are either simple or slightly pubescent ; the fore wings with the tip slightly hooked, and having a waved indentation below the tip. The hind wings have a disposition to a caudal angle. The Caterpillar is rather short, but not humped nor attenuated. The pupa is formed in a cocoon, on the ground, or inclosed in a web among leaves. There are three British species.

Macaria notata (the Peacock, No. 4). The Caterpillar of this prettily marked moth (No. 15) feeds upon the Sallow, and may be looked for in September. The perfect insect appears in the following June. It should be looked for in woods, especially in Kent and Surrey, but it is not common. It has, however, been recently taken near Plymouth, in some abundance, and in many other parts of the country more sparingly.

The other species are the following—*M. alternata* (the Sharp-Angled Peacock), which very closely resembles *Notata*, except in being smaller, deeper coloured, and having all the markings more dusky ; and *A. liturata* (the Tawny-barred Angle, No. 16), which is the largest species, and of a general tawny tone, with deeper tawny bands, and having at the tips of the anterior wings a conspicuous white patch.

The genus *Ania.* The male insects of this genus have the antennæ sub-serrated ; the wings are rather short, and have the anterior pair acute at the angle, and prominent in the middle of the fringed edge ; the

hinder pair being rather angulated. The Caterpillar is attenuated in the anterior segments, and the Chrysalis is formed in a slight cocoon. There is but one well established British species.

Ania emarginata (the Small Scallop, No. 18). This pretty species is placed by some entomologists in the genus *Acidalia*. The Caterpillar, according to Treitschke, is ochreous, with a broad line along the back, which becomes fainter towards the anterior segments. It feeds upon Galium and Convolvulus in July, and the perfect moth appears in the following summer, about the same time.

The genus *Ennomos* (the *Avenlia* of Duponchel). The single British species assigned to this genus is sufficiently marked in its character. The antennæ are pubescent in the males. The fore wings are very sharply pointed at the tip, the point being followed by a deep undulation, beyond which a prominence projects nearly as far as the point. The hinder pair are rounded ; and in repose the wings are extended. The Caterpillar is depressed, has a row of fleshy filaments above the legs, which are twelve in number. The Chrysalis is found in a slight cocoon. Judging only from the perfect insect, it would seem that this species ought to be placed with, or near "the Thorns," but the preparatory stages render it very distinct, and perhaps appropriately located in its present place, though I believe this position will not remain permanent.

Ennomos flexula (the Beautiful Hook-tip, No. 19). The Caterpillar of this pretty species, the structure of which has been described above, is often variegated with green, brown, and white, the attenuated head and tail being orange-brown. It feeds on various Lichens in April and May. The perfect insect appears in June, and is generally found in woods or old gardens, but is rather rare. It has been recently taken in some plenty near Cambridge, and sparingly at Brighton, Plymouth, Dorking, and many other places.


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PLATE XLV.

No. 1.—Scalloped Hook-tip (*Platypteryx lacertinaria*).
No. 2.—The Caterpillar of the Scalloped Hook-tip.
No. 3.—The Pebble Hook-tip (*Drepana falcataria*).
No. 4.—The Caterpillar of the Pebble Hook-tip.
No. 5.—The Chinese Character (*Cilix spinula*).
No. 6.—The Snout (*Hypena proboscidalis*).
No. 7.—The Caterpillar of the Snout.
No. 8.—The Beautiful Snout (*Hypena crassalis*).
No. 9.—The Dotted Fan-foot (*Macrochila cribralis*).
No. 10.—The Common Fan-foot (*Polypogon barbalis*).
No. 11.—The Caterpillar of the Common Fan-foot.
No. 12.—The Fan-foot (*Paracolax tarsicrinalis*).
No. 13.—The Lesser Belle (*Colobochyla Salicalis*).
No. 14.—The Small Snout (*Sinapha angustalis*).
No. 15.—The Dark-lined Snout (*Cledeobea costastrigalis*).
No. 16.—The Marsh Oblique-barred (*Schrankia turfosalis*).
No. 17.—The Tabby (*Aglossa pinguinalis*).
No. 18.—The Meal Moth (*Pyralis farinalis*).
No. 19.—The Gold Fringe (*Hypsopygea costalis*).
No. 20.—The Common Rosy Flounced (*Agrotera flammealis*).
No. 21.—The Long-legged Pearl (*Dolycharthria punctatis*).

My last Plate brought to a close the great Family of the *Geometridæ*, with its nineteen Sub-Families and 107 genera. The present Plate includes the next family, that of the *Platypterieidæ*, containing only three genera: also a portion of the following Family of *Pyralidæ*, to the end of its two first Sub-Families, the *Herminidi* and the *Cledeobidi*.*

FAMILY II.—The Platypterieidæ.

This Family, the second of the third great Sub-Division, *Lepidoptera Semidiurna*, contains three genera of remarkable character, both in the preparatory and perfect stages. In the perfect state, from the singular form of the anterior wings, with their gracefully-curved hook, they have been thought by some Entomologists to display an affinity with the group to which the exotic *Atlas Moth* belongs. In the larva state, on the other hand, the singular *lacertine*, or lizard-like form of the Caterpillars, led the great naturalist Latreille to unite them with the genus *Cerura*, in a group which he termed *Aposura*. There are, however, certain links of character which appear to justify Mr. Stephens' arrangement, in placing them next after the last of the *Geometridæ*. Such, for instance, as the breadth and slight texture of the wings, and the shortness of the legs, in the perfect insect, while the Caterpillars of the last species of the *Geometridæ*, those of *Ennomos flexuola*, resemble in character those of the *Platypterieidæ*. The genera contained in this family are *Platypteryx*, *Drepana*, and *Cilix*.

The genus *Platypteryx*. In this genus the antennæ of the perfect insect are bipectinated in both sexes. The fore wings are strongly hooked at the tip, beyond which is a deep indentation, followed by a corresponding prominence. They have also minor denticulations along the whole of the fringed edge. The hind wings are smooth at the edge, and rounded: the wings are extended horizontally when in repose. The Caterpillars have fourteen feet, the two anal ones being wanting, which allows the last segments to remain raised, giving them the tail-like appearance in which their general resemblance to the form of a small lizard consists.

Platypteryx lacertinaria (the Scalloped Hook-tip, No. 1). The Caterpillar of this pretty moth (No. 2) feeds on the foliage of the Birch, and the moth, which appears from March to June, is not uncommon.

* For a brief recapitulation of the sub-divisions and families of British Moths, see p. 77, vol. ii., and Introduction, vol. i.

There is a pale variety, formerly known as *P. cultraria*, in which the bands across the centre of the wings consist of two narrow lines instead of shaded bars, as in the true species.

The genus *Drepana*. This genus is distinguished from the last by having the anterior wings simply hooked, without any minor denticulations, and they are carried erect when in repose. The males have the antennæ more deeply pectinated than in the preceding genus. The Caterpillar is of similar character, but without the pointed tubercle on the last segment. There are four British species.

Drepana falcataria (the Pebble Hook-tip, No. 3). The Caterpillar of this moth feeds on the foliage of several trees, such as the Trembling Poplar, the Sallow, Alder, Oak, &c. The perfect insect appears in June and August, and is not uncommon.

The other species are *D. sicula* (the Scarce Hook-tip), *D. hamula* (the Oak Hook-tip), which has the fore wings full dark brown, with two lighter bands, and a black central mark, and *D. unguicula*, much smaller, with a broad dark band across all four wings.

The genus *Cilix* is strongly distinguished from either of the preceding genera by the form of the wings, which, instead of being hooked, are bluntly rounded. In the Caterpillar stage, however, the affinity is remarkably shown in the form, which is of the same lacertine, or lizard-like character as those of the other genera assigned to this small and remarkably distinct family.

Cilix spinula (the Chinese Character, No. 5). The Caterpillar of this pretty moth feeds on the Blackthorn, and the moth appears throughout the summer, being a very common species.

The THIRD FAMILY of *Lepidoptera Semidiurna* is that of the *Pyralidæ*. The insects comprised in the genera grouped together in this family are all of comparatively small size ; but several of them present very heterogeneous features, either in the perfect or preparatory stages. The antennæ are generally more or less ciliated in the males. The wings are placed in a triangle when in repose. The front pair of legs are often very long, and those of the males frequently furnished with singular brushes of hairs, capable of expansion or retention ; these are the *Fan-footed* Moths, as they are popularly called. The Caterpillars are in general long, and slightly hairy, having sometimes three and sometimes four pair of ventral feet : but they never assume the *looping* movement in walking, like those of the *Geometridæ*. Some of the species are what are termed Domestic Insects, being found in dwellings, or out-houses, and feeding upon flour, grease, &c. The Caterpillars of other species feed only on aquatic plants, some of them living below the surface of the water, and being furnished at the sides with a peculiar breathing apparatus, formed of filaments, or branchiæ, which perform the function of extracting oxygen from the water.

The genus *Hypena*. This genus is at once distinguished by the elongated palpi, which have the appearance of a forked proboscis, from which this group is popularly known as " the Snouts." The antennæ are slender, and pubescent in the males ; the abdomen is thin, and tufted on the first segment, and the wings are in some species furnished with raised tufts of scales in the centre. The Caterpillars are slender, hairy, and have three pairs of ventral feet. The pupa is pointed, and formed in a silken web among leaves. There are three British species.

Hypena proboscidalis (the Snout, No. 6). The Caterpillar of this species (No. 7) feeds on Nettles in July. The moth appears in the following June and July, and is common everywhere.

The other species, *H. rostralis*, has the fore wings much more bluntly formed at the fringed edge, and has a broad central dark band, bordered with lighter, in which is a small ring of white round a black dot. This is one of the earliest moths of the season.

H. crassalis (the Beautiful Snout, No. 8) has the fore wings dark brown, except a bright dash of cream colour at the base, and a pale border, in which are cream spots, with central specks of black. It is not uncommon, but rather local. There are several varieties, formerly deemed distinct species.

The genus *Macrochila*. In this genus the most marked character is the tuft of hairs on the front feet of the males. They have also very long palpi, like the preceding. The antennæ are either ciliated or pectinated in the males : the wings are without the tufts of scales of the preceding genus. The Caterpillars have all four pair of ventral legs perfect.

Macrochila cribralis (the Dotted Fan-foot, No. 9). The Caterpillar of this, the only British species, is unknown. The moth is taken in fens about the end of July. It has been recently observed in some abundance at Cambridge, and more sparingly at Wicken Fen and at Ranworth.

The genus *Polypogon*. The insects assigned to this genus are very like the preceding in general character, but the Caterpillars have only three pairs of ventral legs. There is but one British species.

Polypogon barbalis (the Common Fan-foot, No. 10). The Caterpillar of this species (No. 11), feeds on the Oak and Birch in September, and in March, either hybernating or being double brooded. The moth appears in June and July, and is rather common. Stowmarket and Tenterden are localities in which it has recently been noticed in great abundance.

The genus *Paracolax*. This genus differs from the two preceding, in having the long middle joint of the palpi curved and ascending, and the terminal joint recurved. The antennæ are slightly bipectinated in the males. The head is tufted. The fore wings are slightly elongated. The anterior tibiæ of the males have tufts of hair, slightly varying in character in the different species.

Paracolax tarsicrinalis (the Fan-foot, No. 12). The Caterpillar of this species feeds on *Trifolium Hispanicum*, and the moth appears at the end of June, in woods.

The other species, *P. nemoralis* (the Small Fan-foot), is much less, but similar in general colour and markings. *P. derivalis* closely resembles *tarsicrinalis*, and is of the same size, but has only two transverse lines on the fore wings instead of three, and only one on the hind wings.

The genus *Colobochyla*. This genus appears to group badly with the others of the family, though there are some general affinities which perhaps excuse its present location. The palpi are short and slender; the antennæ slightly bipectinated in the males. The bands of the front wings do not extend to the hind ones. The legs and feet are slender, and without tufts of hair. The Caterpillar is fourteen legged, but the front ventral pair are undeveloped. The pupa is slender and enclosed in a slight cocoon. There is but one British species.

Colobochyla Salicalis (the Lesser Belle). The Caterpillar feeds on the foliage of the Willow in June. According to M. Guénée, it is entirely green, but yellow at the segmental joints. The moth appears in June, but is very rare. It has been taken once at West Wickham, and formerly at Bexley and Charlton in Kent.

The second sub-family of the *Pyralidæ* is that of the *Cledcobidi*, containing three genera, distinguished by the length and slenderness of the bodies; and by the absence of the maxillary palpi in some of the genera; the labial palpi are, however, long, broad, and hairy. The antennæ of the males are rather strongly bipectinated. The legs are slender and simple. The Caterpillars are unknown.

The genus *Sinapha* has the antennæ of the males bipectinated; and the body longer than the wings. There is but one British species.

Sinapha angustalis (the Small Snout, No. 14). The female of this species is much smaller than the male, and the wings are paler and yellower, and the central band dark. The Caterpillar is unknown, but is said to feed on the Marsh Willow-herb. The Chrysalis was found once under a stone by Professor Zeller, as stated by Mr. Stainton. The moth was once very rare, and chiefly confined to the southern counties. It has recently been taken in some abundance at Brighton and Lewes, and also at Plymouth and other places more sparingly.

The genus *Cledcobia* is very closely allied to *Sinapha*, but is distinguished by the absence of the labial palpi, and the antennæ are short and slightly ciliated. There are two British species.

Cledcobia costæstrigalis (the Dark-line Snout, No. 15). The larva of both the species in this genus is unknown. The moth appears in June and July, and has been taken recently in some plenty at Cambridge, York, and other places.

The other species, *C. albistrigalis*, is distinguished by its white bands, and is rather smaller.

The genus *Schrankia* has the palpi regularly curved and ascending. The antennæ are short and simple. The fore wings are long, and rounded at the hind margin. The preparatory stages are unknown. There is but one British species.

Schrankia turfosalis (the Marsh Oblique-barred). I have not been able to obtain a specimen of this species, but intend giving a representation of it with others in a supplemental plate. It is pale gray, with a conspicuous blackish blotch, followed by a white spot. It has been taken in Delamere Forest, Keswick, Crewe, and in the New Forest.

The third sub-family of the *Pyralidæ* is that of the *Aglossidi*, consisting principally of those moths which frequent buildings, as the Meal Moth, &c. There are five genera.

The genus *Aglossa*. The antennæ of the male are ciliated; the labial palpi porrected, and projecting in front

of the head. The body is stout, and the wings are shining, and have the markings rather indistinct. The Caterpillar is slender and horny-skinned, feeding on fatty substances. The Chrysalis is enclosed in a slight cocoon. There are two British species.

Aglossa pinguinalis (the Tabby, No. 17). The Caterpillar is dull brown, with head and plates darker. It has a horny skin, and feeds on greasy substances, especially old and much used horse-cloths. It is abundant everywhere.

The other species is *A. cuprealis* (the Small Tabby). This species is much smaller, and of a brightish light brown, with indistinct bands of deeper.

The genus *Pyralis*. The antennæ of the males are pubescent beneath ; the palpi are short. The wings are shining, and rather long and narrow, forming a triangle when at rest. The Caterpillars have sixteen perfect feet ; they are hard and shining, and feed on animal substances, or manufactured vegetable matter.

Pyralis farinalis (the Meal Moth, No. 18). This pretty moth is taken about houses and stables in July and August, and is very common.

The other species is *P. glaucinalis*, which is much smaller than *farinalis*, and the wings of which are of a nearly even brown tone, with two rather straight bands of paler.

The genus *Hypsopigia*. This genus is by some writers united with the preceding. The only British species has the antennæ of the males ciliated beneath, the palpi short, and the fore wings triangular and glossy, with the fringe and costal spot of a rich golden colour. There is but one British species.

Hypsopigia costalis (the Gold Fringe, No. 19). The Caterpillar of this pretty species, which is undescribed, is said to feed on Poplars. The moth appears in July and August, in gardens. It was formerly considered rare, and only known in the metropolitan districts, but it has been recently taken at Arundel in great abundance, and at Homerton, Ranworth, &c., in less plenty.

The genus *Agrotera*. This genus is distingnished from the last by the slightly hooked character of the front wings, and the slenderness and length of the body, and also the feet.

Agrotera flammealis (the Common Rosy Flounced, No. 20). The Caterpillar of this delicately marked little moth feeds on Privet, and the moth appears from the end of June to the beginning of July, in woods and heaths, and sometimes in gardens. This species is placed by some in the genus *Endotricha*, the other species only being retained in *Agrotera*. It has been recently taken at Tenterden in abundance, and at many other places.

The other species, *A. nemoralis* (the Rare Rosy Flounced) is a recent discovery. It has the front wings yellow at the base, and is clouded with shades of rich brown, the fringe having two conspicuous white marks. It was taken at Holme Bush, near Henfield, Sussex.

The genus *Dolycharthria* (the *Stenia* of M. Guénée). The antennæ of the males are pubescent ; the palpi rather thick ; the body slender, and extending beyond the hind wings ; the legs slender and very long. The fore wings long and shining, and the hind wings short. There is only one British species.

Dolycharthria punctatis (the Long-legged Pearl, No. 21). The preparatory stages of this curious insect are unknown. It is very rare, and has only been taken at present at few places in Devonshire and the Isle of Wight, and in Cornwall.


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PLATE XLVI.

No. 1.—The Lettered China-mark (*Diasemia literalis*).
No. 2.—The Beautiful China-mark (*Hydrocampa Nymphæata*).
No. 3.—The Caterpillar of the Beautiful China-mark.
No. 4.—The Caterpillar in its leaf-case.
No. 5.—The Ringed China-mark (*Paraponyx Stratiotata*).
No. 6.—The Garden China-mark (*Phlyctænia Sambucalis*).
No. 7.—The Caterpillar of the Garden China-mark.
No. 8.—The Small Magpie (*Eurrhypara Urticata*).
No. 9.—The Caterpillar of the Small Magpie.
No. 10.—The Rusty China-mark (*Ebulea Verbascalis*).
No. 11.—The Orange Cloud (*Nascia cilialis*).
No. 12.—The Rusty Dot (*Udea ferrugalis*).
No. 13.—The Dingy Pearl (*Mecyna asinalis*).
No. 14.—The Rush Veneer (*Nomophila Noctuella*).
No. 15.—The Mother-of-Pearl (*Botys verticalis*).
No. 16.—The Long-winged Pearl (*Botys lanceolalis*).
No. 17.—The Lesser Pearl (*Epicorsia cinctalis*).
No. 18.—The Sulphur (*Sitochroa palealis*).
No. 19.—The Straw Dot (*Rivula sericealis*).

THE fourth sub-family of the *Pyralidæ* is that of the *Nymphalidi*, containing three genera: *Diasemia*, *Hydrocampa*, and *Paraponyx*, all the Caterpillars of which are aquatic or semi-aquatic.

The genus *Diasemia* may be considered the type of the pretty group of small Moths known to collectors as the China-marks. The fore wings are slender and slightly falcate. The antennæ are short and ciliated. The labial palpi are close together, in a beak-like form, and pointing downwards. The body is slender, and extends rather beyond the wings. The Caterpillar is aquatic. There is but one British species.

Diasemia literalis (the Lettered China-mark, No. 1), is taken in June and July in damp places. It has been recently captured at Lyndhurst, Sanderstead, and other places.

The genus *Hydrocampa*. In this genus the antennæ of the male are simple. The palpi rather short, close together, and pointing upwards. The hind wings are without a dark spotted margin. The Caterpillar is thicker in the middle, and is completely aquatic, as the name of the genus imports, being compounded of the Greek words ὕδρος (watery), and καμπη (a caterpillar). It is generally found on the underside of the leaves of water lilies, enclosed in a flattened case. There are three species.

Hydrocampa Nymphæata (the Beautiful China-mark, No. 2). This is perhaps the most delicately marked of the genus, as the popular name imports; and it exhibits, in the clear brown markings on a white ground, that porcelain-like delicacy of tone which suggested the name of China-marks to our early collectors. The specific name, *Nymphæata*, which is transferred by some writers to another species (the Brown China-mark), was no doubt adopted in allusion to the favourite food of the Caterpillars of some of this genus, the leaves of the White Water-lily, *Nymphæa alba*. The Caterpillar of this species, however (No. 3), feeds upon the common Duck-weed, forming for itself a sort of protective case from the leaf of some other aquatic plant (see No. 4). It should be stated, however, that the Caterpillar here represented is supposed by some authors to belong to another species: and, indeed, the matter requires investigation, although the Moth itself is so common. It appears about June and July, and in damp places is common in all parts of the country.

The other species are the following:—*H. Potamogata* (the Brown China-mark), which is much larger, and the Caterpillar of which is the one known to feed upon the leaf of the Water-lily, or upon the Potamogeton, from which it takes its name; and *H. Lemnata*, (the Small China-mark), which is less even than *H. Nymphæata*, and

may be distinguished by the broad and abruptly-terminating dark border, spotted with white, which ornaments the hind wings.

The genus *Paraponyx*. The insects assigned to this genus have been separated from the *Hydrocampæ* chiefly on account of the singular structure of the Caterpillars, which have, in addition to the usual spiracles, a breathing apparatus composed of branchiæ, analogous to those of the larvæ of the Lesser Dragon-fly and other aquatic larvæ.

Paraponyx Stratiotata (the Ringed China-mark, No. 5). This pretty species is as common as the preceding. The Caterpillar is described by M. Guénée as being of a whitish-green colour, with a darker line down the back, and the head brown, and having minute feather-like appendages connected with the organs of respiration. It feeds upon the beautiful plant *Stratiotes aloides*, and the Moth appears in June and July, being common in marshy places, but rather more local than the other China-marks.

The next, and fourth, Sub-Family, of the *Pyralidæ* is that of the *Botydi*, which comprises most of that pretty group of small moths popularly known as the Pearls. The antennæ are filiform, the abdomen generally long and slender. The wings are also of narrow proportions, forming a long deflexed triangle when in repose, and they have generally a pearly gloss, which has suggested the popular name of the group. The Caterpillars are slender, sixteen-footed, and form the chrysalis in a cocoon of dried leaves or moss webbed together.

The genus *Phyctœnia*. The single British insect assigned to this genus forms a link between the true China-marks and the Pearls. The antennæ are simple in both sexes. The palpi are long and horizontal. The wings are dark-coloured, with pale blotches. The Caterpillar is not aquatic, and forms a compact cocoon, in which it undergoes the change to the chrysalis state.

Phyctœnia Sambucalis (the Garden China-mark, No. 6). This is a very pretty species. The Caterpillar (No. 7) feeds upon the foliage of the Elder, in September and October, and the Moth appears in the following June, being very common in gardens.

The genus *Eurrhypara*. The typical insects of this genus have the body rather long, and belted with black. The palpi are short, the antennæ long and slender. The wings are moderately long, and are generally white, strongly marked with dark brown or black, from which they have been termed the Magpies. The Caterpillar is sixteen-footed, and the chrysalis is produced in a rolled leaf.

Eurrhypara Urticata (the Small Magpie, No. 8). The Caterpillar (No. 9) of this conspicuous insect is a Nettle feeder, in September. It remains in the chrysalis state through the winter, and the perfect insect appears in the following June. It is abundant everywhere in lanes and gardens.

The genus *Ebulea*. The antennæ of the insects assigned to this genus are simple in both sexes. The abdomen is slender. The wings are rather broad, and the tips of the anterior pair rather pointed. The Caterpillars are short, and attenuated at each end. The Chrysalides are enclosed in a cocoon among leaves. There are two British species in the system I am following, but some authors also assign the species last described to this genus.

Ebulea Verbascalis (the Rusty China-mark, No. 10) is not a common species; Darenth Wood, Ranworth, Chatham, and Charlton, are cited as localities in which it has been recently taken; and though it is extremely local, it is sometimes abundant in its favourite haunts. The Caterpillar is unknown.

The other species of *Ebulea* is *E. crocealis*, which closely resembles the preceding in form and general tone of colour; but the front wings are of nearly unvaried pale ochreous brown, without the bands and markings of *Verbascalis*, and the hind wings are very pale ochre, with only a faint band near the border.

The genus *Nascia*. In this genus the antennæ are slender and filiform, but slightly pubescent in the males. The palpi are united, like a beak, and drooping. The fore wings have the apex slightly hooked. There is but one British species.

Nascia cilialis (the Orange Cloud, No. 11). The Caterpillar of this species is unknown, and the Moth is very local and rare. It was first taken near Cambridge; and Yaxley, and Wicken Fen are localities in which it has been most lately observed.

The genus *Udea*. The British species which is now placed in this genus, in the system I am following, was located by Mr. Stephens in the genus *Margaritia*, and is now placed by some writers in the genus *Scopula*. With

the insects assigned to both these genera it is very closely related, but minute anatomical distinctions appear to warrant its separation.

Udea ferrugalis (the Rusty Dot, No. 12). The larva of this species is unknown, and the Moth was once considered rather rare, but it is now found to be tolerably plentiful in some localities. Plymouth, Brighton, Ventnor, Malahide in Ireland, and other places have furnished specimens in some plenty.

The genus *Mecyna*. A single British species, formerly placed in the genus *Margaritia*, is now removed to this genus of M. Guénée's, which corresponds with the genus *Mesographe* of Hübner. The wings are sharper and more hooked than in the species from which it has been separated; otherwise it bears signs of a very close relationship with them. It is placed by Mr. Stainton in the genus *Botys*.

Mecyna asinalis (the Dusky Pearl, No. 13). The first specimens taken of this species were those captured by Captain Blomer, near Teignmouth, and at Barnstaple by Mr. Raddon. Specimens have since been taken at Llandudno, in North Wales, and Ventnor, in the Isle of Wight.

The genus *Nomophila*. In this genus the antennæ of the males are filiform, but pubescent underneath. The palpi are turned upwards. The fore wings are long and narrow, and slightly transparent, especially the hinder pair. Mr. Stephens removed it from the *Tineæ*.

Nomophila Noctuella (the Rush Veneer, No. 14). The larva of this species, if carefully sought, might be found in rushy districts frequented by the perfect insect, but it remains as yet undescribed. In marshy places, where rushes abound, the perfect insect is far from uncommon in many parts of the country.

The genus *Botys*, of Latreille, accords pretty well with Mr. Stephens's genus *Margaritia*, founded by that author for the location of the Pearls, in 1829, but the priority of the term of Latreille has caused it to take precedence. The antennæ of the males are either simple, or merely pubescent. The abdomen is longer than the wings. The wings are generally of different shades of brown, the hind wings being similarly marked to the front pair, and having, more or less, a pearly gloss. The Caterpillars are attenuated at each extremity and often semi-transparent. The Chrysalides are formed in slight cocoons among leaves. There are nine species.

Botys Verticalis (the Mother-of-Pearl, No. 15). This prettily marked species may be said to be the type of the genus, as it is the most pearly in its gloss, and in other respects best displays the generic characters, though its markings are more distinct than in most of the other species. The Caterpillar feeds spun up within the leaves of the Nettle, in May. According to M. Guénée it is semi-transparent, greenish at the sides, and whitish on the back, with a dark dorsal line. It becomes a Chrysalis in June, and the perfect insect appears in July. It is common everywhere.

Botys lancealis (the Long-winged Pearl, No. 16) may be easily distinguished by the length of the wings. The Caterpillar is unknown.

The other seven species are all congeneric in the leading characters. They are, *B. perpendicularis* (the Scarce Mother-of-Pearl), *B. Pandalis* (the Bordered Pearl), *B. hyalinalis* (the Scarce Pearl), *B. flavalis* (the Gold China-mark), *B. silacealis* (the Dingy Pearl), *B. fuscalis* (the Cinereous Pearl), and *B. Terrealis* (the Northern Pearl).

The genus *Epicorsia*. The British insect assigned to this genus has been separated from the genus *Margaritia* on account of the much greater depth of the hind wings, and their complete opacity. They are in fact thickly clothed underneath with white scales, which causes a striking contrast between the upper and under surfaces. The Caterpillar which feeds on Broom is undescribed.

Epicorsia cinctalis (the Lesser Pearl, No. 17). This pretty species is generally taken in Clover fields about July, and is not uncommon.

The genus *Sitochroa*. The single insect assigned to this genus of Hübner's is by some authors placed with two other British species in M. Guénée's genus *Spilodes*. It closely resembles the true Pearls in its general characters, but the front wings are of a sulphureous green.

Sitochroa palealis (the Sulphur, No. 18). This pretty insect is still a rarity. The Caterpillar is described by Treitschke as being whitish with a dorsal line of pale grey, and black spots; the head being yellowish white speckled with black. It feeds on several umbelliferous plants, such as Wild Carrot, &c. in August and

September, and the perfect insect appears in the following June and July. It has been taken at Dover, and in Norfolk, and more recently at Folkestone.

The genus *Rivula*. The British species assigned to this genus has the antennæ short and pubescent ; the palpi short ; the abdomen slender ; the fore-wings rounded at the hinder margin. The Caterpillar is short and thick, and speckled with conspicuous black spots ; the skin is shining. It feeds on low plants. The Chrysalis is attached by the tail and by a belt of web round the middle.

Rivula sericealis (the Straw Dot). The Caterpillar of this species is velvety green, with a darker line down the back and white stripes at the sides. It feeds on grasses in May, and the Moth appears in June and July, in woods. It has recently appeared very abundantly at Brighton, Tenterden, Worcester, and other places.

may be distinguished by the broad and abruptly-terminating dark border, spotted with white, which ornaments the hind wings.

The genus *Paraponyx*. The insects assigned to this genus have been separated from the *Hydrocampæ* chiefly on account of the singular structure of the Caterpillars, which have, in addition to the usual spiracles, a breathing apparatus composed of branchiæ, analogous to those of the larvæ of the Lesser Dragon-fly and other aquatic larvæ.

Paraponyx Stratiotata (the Ringed China-mark, No. 5). This pretty species is as common as the preceding. The Caterpillar is described by M. Guénée as being of a whitish-green colour, with a darker line down the back, and the head brown, and having minute feather-like appendages connected with the organs of respiration. It feeds upon the beautiful plant *Stratiotes aloides*, and the Moth appears in June and July, being common in marshy places, but rather more local than the other China-marks.

The next, and fourth, Sub-Family, of the *Pyralidæ* is that of the *Botydi*, which comprises most of that pretty group of small moths popularly known as the Pearls. The antennæ are filiform, the abdomen generally long and slender. The wings are also of narrow proportions, forming a long deflexed triangle when in repose, and they have generally a pearly gloss, which has suggested the popular name of the group. The Caterpillars are slender, sixteen-footed, and form the chrysalis in a cocoon of dried leaves or moss webbed together.

The genus *Phyctænia*. The single British insect assigned to this genus forms a link between the true China-marks and the Pearls. The antennæ are simple in both sexes. The palpi are long and horizontal. The wings are dark-coloured, with pale blotches. The Caterpillar is not aquatic, and forms a compact cocoon, in which it undergoes the change to the chrysalis state.

Phyctænia Sambucalis (the Garden China-mark, No. 6). This is a very pretty species. The Caterpillar (No. 7) feeds upon the foliage of the Elder, in September and October, and the Moth appears in the following June, being very common in gardens.

The genus *Eurrhypara*. The typical insects of this genus have the body rather long, and belted with black. The palpi are short, the antennæ long and slender. The wings are moderately long, and are generally white, strongly marked with dark brown or black, from which they have been termed the Magpies. The Caterpillar is sixteen-footed, and the chrysalis is produced in a rolled leaf.

Eurrhypara Urticata (the Small Magpie, No. 8). The Caterpillar (No. 9) of this conspicuous insect is a Nettle feeder, in September. It remains in the chrysalis state through the winter, and the perfect insect appears in the following June. It is abundant everywhere in lanes and gardens.

The genus *Ebulea*. The antennæ of the insects assigned to this genus are simple in both sexes. The abdomen is slender. The wings are rather broad, and the tips of the anterior pair rather pointed. The Caterpillars are short, and attenuated at each end. The Chrysalides are enclosed in a cocoon among leaves. There are two British species in the system I am following, but some authors also assign the species last described to this genus.

Ebulea Verbascalis (the Rusty China-mark, No. 10) is not a common species; Darenth Wood, Ranworth, Chatham, and Charlton, are cited as localities in which it has been recently taken; and though it is extremely local, it is sometimes abundant in its favourite haunts. The Caterpillar is unknown.

The other species of *Ebulea* is *E. crocealis*, which closely resembles the preceding in form and general tone of colour; but the front wings are of nearly unvaried pale ochreous brown, without the bands and markings of *Verbascalis*, and the hind wings are very pale ochre, with only a faint band near the border.

The genus *Nascia*. In this genus the antennæ are slender and filiform, but slightly pubescent in the males. The palpi are united, like a beak, and drooping. The fore wings have the apex slightly hooked. There is but one British species.

Nascia cilialis (the Orange Cloud, No. 11). The Caterpillar of this species is unknown, and the Moth is very local and rare. It was first taken near Cambridge; and Yaxley, and Wicken Fen are localities in which it has been most lately observed.

The genus *Udea*. The British species which is now placed in this genus, in the system I am following, was located by Mr. Stephens in the genus *Margaritia*, and is now placed by some writers in the genus *Scopula*. With

the insects assigned to both these genera it is very closely related, but minute anatomical distinctions appear to warrant its separation.

Udea ferrugalis (the Rusty Dot, No. 12). The larva of this species is unknown, and the Moth was once considered rather rare, but it is now found to be tolerably plentiful in some localities. Plymouth, Brighton, Ventnor, Malahide in Ireland, and other places have furnished specimens in some plenty.

The genus *Meeyna.* A single British species, formerly placed in the genus *Margaritia*, is now removed to this genus of M. Guénée's, which corresponds with the genus *Mesographe* of Hübner. The wings are sharper and more hooked than in the species from which it has been separated ; otherwise it bears signs of a very close relationship with them. It is placed by Mr. Stainton in the genus *Botys.*

Meeyna asinalis (the Dusky Pearl, No. 13). The first specimens taken of this species were those captured by Captain Blomer, near Teignmouth, and at Barnstaple by Mr. Raddon. Specimens have since been taken at Llandudno, in North Wales, and Ventnor, in the Isle of Wight.

The genus *Nomophila.* In this genus the antennæ of the males are filiform, but pubescent underneath. The palpi are turned upwards. The fore wings are long and narrow, and slightly transparent, especially the hinder pair. Mr. Stephens removed it from the *Tineæ.*

Nomophila Noctuella (the Rush Veneer, No. 14). The larva of this species, if carefully sought, might be found in rushy districts frequented by the perfect insect, but it remains as yet undescribed. In marshy places, where rushes abound, the perfect insect is far from uncommon in many parts of the country.

The genus *Botys*, of Latreille, accords pretty well with Mr. Stephens's genus *Margaritia*, founded by that author for the location of the Pearls, in 1829, but the priority of the term of Latreille has caused it to take precedence. The antennæ of the males are either simple, or merely pubescent. The abdomen is longer than the wings. The wings are generally of different shades of brown, the hind wings being similarly marked to the front pair, and having, more or less, a pearly gloss. The Caterpillars are attenuated at each extremity and often semi-transparent. The Chrysalides are formed in slight cocoons among leaves. There are nine species.

Botys Verticalis (the Mother-of-Pearl, No. 15). This prettily marked species may be said to be the type of the genus, as it is the most pearly in its gloss, and in other respects best displays the generic characters, though its markings are more distinct than in most of the other species. The Caterpillar feeds spun up within the leaves of the Nettle, in May. According to M. Guénée it is semi-transparent, greenish at the sides, and whitish on the back, with a dark dorsal line. It becomes a Chrysalis in June, and the perfect insect appears in July. It is common everywhere.

Botys lancealis (the Long-winged Pearl, No. 16) may be easily distinguished by the length of the wings. The Caterpillar is unknown.

The other seven species are all congeneric in the leading characters. They are, *B. perpendicularis* (the Scarce Mother-of-Pearl), *B. Pandalis* (the Bordered Pearl), *B. hyalinalis* (the Scarce Pearl), *B. flavalis* (the Gold China-mark), *B. silacealis* (the Dingy Pearl), *B. fuscalis* (the Cinereous Pearl), and *B. Terrealis* (the Northern Pearl).

The genus *Epicorsia.* The British insect assigned to this genus has been separated from the genus *Margaritia* on account of the much greater depth of the hind wings, and their complete opacity. They are in fact thickly clothed underneath with white scales, which causes a striking contrast between the upper and under surfaces. The Caterpillar which feeds on Broom is undescribed.

Epicorsia cinctalis (the Lesser Pearl, No. 17). This pretty species is generally taken in Clover fields about July, and is not uncommon.

The genus *Sitochroa.* The single insect assigned to this genus of Hübner's is by some authors placed with two other British species in M. Guénée's genus *Spilodes.* It closely resembles the true Pearls in its general characters, but the front wings are of a sulphureous green.

Sitochroa palealis (the Sulphur, No. 18). This pretty insect is still a rarity. The Caterpillar is described by Treitschke as being whitish with a dorsal line of pale grey, and black spots ; the head being yellowish white speckled with black. It feeds on several umbelliferous plants, such as Wild Carrot, &c. in August and

September, and the perfect insect appears in the following June and July. It has been taken at Dover, and in Norfolk, and more recently at Folkestone.

The genus *Rivula*. The British species assigned to this genus has the antennæ short and pubescent; the palpi short; the abdomen slender; the fore-wings rounded at the hinder margin. The Caterpillar is short and thick, and speckled with conspicuous black spots; the skin is shining. It feeds on low plants. The Chrysalis is attached by the tail and by a belt of web round the middle.

Rivula sericealis (the Straw Dot). The Caterpillar of this species is velvety green, with a darker line down the back and white stripes at the sides. It feeds on grasses in May, and the Moth appears in June and July, in woods. It has recently appeared very abundantly at Brighton, Tenterden, Worcester, and other places.


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PLATE XLVII.

No. 1—The Garden Pebble (*Mesographe forficalis*).
No. 2.—The Caterpillar of the Garden Pebble.
No. 3.—The Clouded Yellow Pearl (*Evergestis margaritalis*).
No. 4.—The Caterpillar of the Clouded Yellow Pearl.
No. 5.—The Chequered Straw (*Pionea stramentalis*).
No. 6.—The Diamond Spot (*Spilodes sticticalis*).
No. 7.—The Pale Straw (*Scopula Ætialis*).
No. 8.—The Dusky Brindled (*Scopula Prunalis*).
No. 9.—The Caterpillar of the Dusky Brindled.
No. 10.—The Starry Brindle (*Cynæda dentalis*).
No. 11.—The Caterpillar of the Starry Brindle.
No. 12.—The Scarce Crimson and Gold (*Rhodaria sanguinalis*).
No. 13.—The Crimson and Gold (*Pyrausta purpuralis*).
No. 14.—The Purple and Gold (*Pyrausta puniccalis*).
No. 15.—The Caterpillar of the Purple and Gold.
No. 16.—The Wavy-barred Sable (*Ennychia anguinalis*).
No. 17.—The White Spot (*Anania octomaculata*).

THE sixth sub-family of the *Pyralidæ* consists of the *Scopulidi*, containing six genera—*Mesographe*, *Evergestis*, *Pionea*, *Spilodes*, *Scopula* and *Cynæda*. The insects located in these genera differ in various degrees both from the China-marks and the Pearls, though some of the species are still placed by some authors in each of those groups.

The genus *Mesographe*. The insects assigned to this genus have the body rather short and slender; the palpi short, and pointing downwards; the antennæ slender; the wings generally straw colour, with slender brown transverse bands. The Caterpillar of the only British species is smooth, and sixteen-footed.

Mesographe forficalis (the Garden Pebble, No. 1). This species is placed by some authors in M. Guénée's closely-allied genus *Pionea*. The Caterpillar (No. 2) feeds on Horse-radish in June and July, and again in September and October. The moth appears in May, and again in August, and is common everywhere.

The genus *Evergestis*. One of the Pearls, is assigned to this genus of Hübner's in the system I am following, in preference to the partially corresponding genus *Pionea* of M. Gnénée.

Evergestis margaritalis (the Clouded Yellow Pearl, No. 3). The Caterpillar (No. 4) is said to feed on the seeds of the Wild Mustard in August, and the moth is found in the following July. It was formerly considered rare, but has recently been taken in abundance at Cambridge, and more sparingly at Deal, Ranworth, and some other places.

The genus *Pionea*. The genus *Pionea*, founded by M. Guénée, is made by some English authors to contain the two species assigned to the two last described genera, as well as the one here assigned to it. It is defined by M. Guénée as comprising insects belonging to the present group, which have the antennæ of the male simple, the abdomen slender, and rather longer than the wings; the fore-wings have the tips rather hooked, and the hind-wings with no central spot. The Caterpillars are thick and fusiform, and feed on various cruciferous plants, sometimes on the leaves and sometimes amongst the seeds.

Pionea stramentalis (the Chequered Straw, No. 5). The Caterpillar of this species is unknown, but the Moth is found in considerable numbers in some localities, especially near Brighton, and at Pembury, in Kent. It is also found at Shawley Wood, Worcestershire, and in several marshy places in the metropolitan counties.

The genus *Spilodes*. In this genus of M. Guénée, corresponding to the genus *Uresiphita* of Hübner, the species described in the last plate, *Sitochroa palealis* and *Epicorsia cinctalis* are placed, in addition to the single

species assigned to it in the system I am following. According to M. Guénée's definition of the genus, the insects to be located in it have the antennæ of the male simple, and the palpi short; the fore-wings are rather pointed at the tip; the Caterpillars are thick and shining, with warty spots; and they feed among the flowers of low plants or shrubs, generally protected by a web. The Chrysalis is enclosed in a slight silky cocoon.

Spilodes sticticalis (the Diamond Spot, No. 6). The Caterpillar of this species, according to Treitschke, is green, with a dorsal line edged with yellow; and with yellow lines at the sides. It feeds on Artemisia in July and August, and the Moth appears in September. It has been recently taken at Birkenhead, Brighton, Pembury, &c., but is always rather rare.

The genus *Scopula*. Three of the species now assigned to this genus were formerly placed by Mr. Stephens in the genus *Margaritia*, along with many of the Pearls, and several allied species. The insects at present assigned to the genus *Scopula* have the antennæ of the male simple; the palpi rather long; the wings silky and shining; the stigmata distinct; and the hind wings have a central spot. The Caterpillars are rather elongate, and feed between leaves, in a gallery open at both ends. The Chrysalis is formed in a cocoon. There are four species.

Scopula Ætialis (the Pale Straw, No. 7). The Caterpillar of this pretty species is unknown, and the perfect insect is rare, though very widely dispersed. It appears in July.

S. prunalis (the Dusky Brindled, No. 8) is easily distinguished by the colours of the front and hind wings being the same. The Caterpillar (No. 9) feeds on Blackthorn, and also on low plants, in April and May, and the perfect insect appears in June and July. It is abundant everywhere.

The other species of *Scopula* is *S. Alpinalis*, which has the front wings of a rich tawny hue, and the hind wings of a pale straw colour, deepening towards the edge to a tone of pinkish brown.

The genus *Cynæda* (the *Odontia* of Duponchel). The antennæ are short, slender, and slightly pubescent. The palpi, though short, extend slightly in the front of the head in a beak-like form. The wings have a tuft of scales on the inner margin. The Caterpillars are short, attenuated at each end, and feed within the stems of various plants. There is only one British species.

Cynæda dentalis (the Starry Brindle, No. 10). The Caterpillar of this pretty species (No. 11) is shown on the surface of a stem, when about to form its chrysalis. It is nearly colourless, except the head, as are most of the pith-feeding Caterpillars. It prefers the stems of *Echium vulgare*, the common Viper Bugloss. The Chrysalis is formed in a compact cocoon of silk among the leaves of the plant. This pretty Moth is very rare, but has been recently taken at Lewes, Deal, Folkstone, and some other places.

The Seventh sub-family of the *Pyralidæ* is that of the *Ennychidi*. The species of this family are, with few exceptions, day insects, and delight in the brightest sunshine. The antennæ of the males are simple, or only pubescent. The abdomen slender, generally with pale belts. The wings are silky, and the hinder ones frequently marked like the anterior pair. The larvæ are short, with warty spots, and feed between leaves brought together by a web. There are four genera—*Rhodaria*, *Pyrausta*, *Ennychia*, and *Anania*.

In the genus *Rhodaria*, the antennæ of the males are pubescent. The abdomen is not belted. The hind wings are not banded like the front pair. It flies at dusk. The Caterpillar is unknown. There is but one British species.

Rhodaria sanguinalis (the scarce Crimson and Gold, No. 12). This pretty species was formerly deemed extremely rare, but it has lately been taken in considerable numbers at Birkenhead, and also in Ireland. It is, however, very local, and may still be considered rare, though there are thirty fine specimens in the cabinet of the British Museum. It must be sought among long grass in shady places, and not on short turf in the sun, like others of the group.

The genus *Pyrausta*. The antennæ of the males are slender and simple. The palpi are short and straight. The abdomen is distinctly belted. The wings are generally brightly coloured, and the flight is diurnal. The Caterpillars are short, and attenuated at the extremities, and feed in a web between the leaves of various plants. The pupa is formed in a cocoon among leaves. There are four species.

Pyrausta purpuralis (the Crimson and Gold, No. 13). The Caterpillar of this conspicuous little insect is, according to Hübner, of a dark gray colour, with yellowish stripes, and dark spots edged with white. It is found

in June and July, on different kinds of Mint. The Moth appears both in May and August, so that it would appear that there are two broods. It is very common, and has recently been taken in great abundance at Kingsbury (in Middlesex) and in many other places very plentifully, especially in the southern counties.

Pyrausta punicealis (the Purple and Gold, No. 14). The Caterpillar of this species (No. 15) feeds on *Origanum* (the common Marjoram) in June and July, and the Moth appears in May and August. It is very common, and has recently been observed in great abundance at Lewes, Worthing, and many other places.

The genus *Ennychia*. The antennæ of the males are simple. The palpi porrected. The abdomen has numerous belts of white, and the wings are dark coloured, with white lines or spots. The Caterpillars are unknown. The moths in the bright sunshine. There are two species.

Ennychia anguinalis (the Wavy-barred Sable, No. 16). This darkly toned insect is not easily seen when on the flight, and is therefore not often taken by young collectors, but it has recently occurred in plenty near Brighton, Bristol, Cambridge, and other places.

The other species, *E. cingulata* (the Silver-barred Sable), may be distinguished by the absence of the inner light band, and also of the light central spot.

The genus *Anania*. The antennæ are long, slender, and simple. The palpi not quite so long as the head. The palpi are joined and beak-like. The wings form a triangle in repose. The Caterpillars are unknown. The only British species, *A. octomaculata*, is assigned by some writers to the genus *Pyrausta*.

Anania octomaculata (the White Spot, No. 17). The Caterpillar of this conspicuous little insect is unknown. The Moth appears in June and July, but is rare, though widely dispersed. It has been taken recently in several places in Kent and Sussex ; also in North Wales, and in Ireland.


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PLATE XLVIII.

No. 1.—The Double-barred Nettle-tap (*Simaethis Pariana*).
No. 2.—The Caterpillar of the Double-barred Nettle-tap.
No. 3.—The Cocoon of the Double-barred Nettle-tap.
No. 4.—The Least Black Arches (*Nola Cristulalis*).
No. 5.—The Green Silver Lines (*Hylophila Prasinana*).
No. 6.—The Caterpillar of the Green Silver Lines.
No. 7.—The Cocoon of the Green Silver Lines.
No. 8.—The Scarce Silver Lines (*Hylophila Quercana*).
No. 9.—The Caterpillar of the Scarce Silver Lines.
No. 10.—The Chrysalis of the Scarce Silver Lines.
No. 11.—The Cream-bordered Green Pea (*Earias clorana*
No. 12.—The Caterpillar of the Cream-bordered Green Pea.
No. 13.—The Cocoon of the Cream-bordered Green Pea.
No. 14.—The Pea Green T. (*Tortrix viridana*).
No. 15.—The Plain Yellow T. (*Tortrix Palleana*).

THE eighth sub-family of the *Pyralidæ* is that of the *Tortricidi*, forming a link between the present family and that of the *Tortricidæ*, the illustration of which we are about to commence. The sub-family of *Tortricidi* includes only two genera, *Simaethes* and *Nola*, which while they begin to assume the general form of the true *Tortrices*, yet retain in their markings the character of *Pyralidæ*. This sub-family would appear, however, to require a more distinct title, as the same term, *Tortricidi*, is applied, in the system I am following, to the second sub-family of the true *Tortricidæ*.

The genus *Simaethis*. The antennæ of the males are strongly ciliated; the palpi are porrected obliquely, and the tips straight. The body is short but not robust. The wings are short and broad, and when at rest form nearly a triangle and cover the hind wings. The Caterpillars have sixteen legs and feed in a white web on the leaves of various plants. The Chrysalis is formed in a firm white cocoon. There are four species.

Simaethis Pariana (the Double-barred Nettle-tap, No. 1). The Caterpillar of this species (No. 2) feeds on the foliage of the Apple and Hawthorn, in June and August, forming its cocoon (No. 3) on the upper surface of a leaf. The perfect insect appears in July and September, and is abundant everywhere.

The other species are, *S. Fabriciana* (the Nettle-tap) which is much darker, the hind-wings being as dark as the front, and traversed by a pale band; *S. Angustana* (the Silver-dotted Nettle-tap), easily distinguished by its metallic spots; and *S. Vibrana* (the Scarce Nettle-tap), which has the front wings brown, and towards the base tawny, with several transverse silvery lines, tinged with a pink or greenish flush. This species is very rare, but has been recently taken at Hurst, in Sussex.

The genus *Nola*. The males have the antennæ ciliated, the palpi rather long, and pointing downwards; the fore-wings have three raised tufts of scales, the hind-wings are rounded and without markings. The Caterpillars are Lichen feeders. They have only fourteen legs and are thick and rather hairy. The Pupa is enclosed in a boat-shaped cocoon. Figures of the transformations of this curious genus are engraved in Mr. Westwood's Modern Classification of Insects. There are three species.

Nola Cristulalis (the Least Black Arches, No. 4). The Caterpillar of this species, according to Hübner, is whitish yellow with black lines, a little reddish at the sides. It feeds on the foliage of the Oak in May, and the Moth appears in May and June. It has been taken recently near Brighton rather abundantly, and sparingly in other places, especially in woody localities, but it is not common.

The other two species are *N. Strigula* (the Small Black Arches), which resembles the preceding but is much darker, and *N. Cucullatella* (the Small Cloaked), which has the transverse band of the front wings more solid and of a darker tone, the entire base of the wings up to the first band being deep brown.

The *Tortricidæ* belong to a distinct subdivision, the position of which with reference to the whole order may be stated as follows :—

ORDER LEPIDOPTERA. (MICRO-LEPIDOPTERA.)

SUB-DIVISION IV.—LEPIDOPTERA VESPERTINA.

FAMILY I.—TORTRICIDÆ.

The family *Tortricidæ*, though much restricted in modern arrangements. still contains a considerable number of insects, all of which have a strong family likeness, the chief characteristics being the following. With the exception of the Green Silver-lines they are all of comparatively small size, and all have the peculiar waved outline of the front of the anterior wings (sometimes curiously notched in the margin), which, when they are closed gives the whole insect a bell-like form which is unmistakeable. The antennæ are simple or but slightly ciliated. The abdomen is both short and slender, the thorax rarely crested. The Caterpillars are smooth and have the full complement of sixteen feet. They are nearly all leaf rollers, from which the name *Tortrix*, first applied by Linnæus himself, is derived, which corresponds to the *Tordeuses* of Latreille, who also took this habit of the group as a family distinction. Some of them, however, feed in the pulpy part of fruit.

The first sub-family of the *Tortricidæ* is that of the *Cymbidi*, containing those species which have green wings, and which are tolerably distinct from the rest of the family, especially the two large species of *Hylophila*.

The genus *Hylophila*. The insects comprised in this genus present many aberrant characters which distinguish them from the rest of the *Tortricidæ*. They are superior in size ; and in the preparatory stages, the peculiar form of the Caterpillar, getting gradually thinner towards the tail, caused Reaumur to distinguish them as fish-formed Caterpillars, *Chenilles en forme de poisson*. The Chrysalis is in the form of a reversed boat, attached, keel uppermost, to a leaf. The green colour of the wings is also a conspicuous distinction.

Hylophila prasinana (the Green Silver-lines). The Caterpillar of this beautiful insect (No. 6) feeds on the foliage of Oak, Ash, and other trees, in July and August, forming its cocoon upon a leaf as shown at No. 7. The Moth appears in the following May. It is common in well wooded districts near London.

Hylophila Quercana (the Scarce Silver-lines, No. 8). The Caterpillar (No. 9) feeds upon Oak and other trees in May, and the perfect insect appears in July. The Chrysalis (No. 10) is beautifully tinted with green. It is much more rare than the preceding species, especially near London.

The genus *Earias*. The insects assigned to this genus are much smaller than those of the genus *Hylophila*. They have the palpi shorter and stouter ; the antennæ are slightly pubescent in the males, and the fore wings are not banded with white. The Caterpillar is attenuated towards the tail, and feeds among leaves webbed together. The cocoon is firm and boat-shaped as in *Hylophila*. There is but one British species.

Earias clorana (the Cream-bordered Green Pea). The Caterpillar of this delicately coloured little Moth feeds on the foliage of different kinds of Willow, in August, and the Moth appears in the following May, and also in June and July. It is common in Osier beds. The cocoon is figured at No. 13.

The second sub-family of the *Tortricidæ* is that of the *Tortricidi*, containing the typical *Tortrices*. There are in this Sub-Family several genera and sub-genera, some of them containing many species.

The genus *Tortrix*. In this genus the antennæ are pubescent in the males, the palpi are longer than the head ; the head is thickly tufted. The wings are without the bands or front borders of the two preceding genera. The Caterpillars are similar in structure to the last described, but the Chrysalides have the abdominal segments serrated, which is not the case in either of the preceding genera.

Tortrix viridana (the Pea Green T., No. 14). The Caterpillar of this insect is green, getting yellowish towards the tail, and sprinkled with black spots, the head being brown. It feeds on Oak, Hornbeam, &c. in May and June, the perfect Moth appearing in June and July. It is abundant everywhere.

Tortrix palleana (the Plain Yellow T., No. 15). This pretty insect is somewhat rare. It has been taken in July and August near Dover. There are two other species, *T. icterana* (the Jaundiced T.), and *T. viburnana* (the Drab T.).


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PLATE XLIX.

No. 1.—The Hazel T (*Lozotænia Sorbiana*).
No. 2.—The Grotian T (*Dichelia Grotiana*).
No. 3.—The Gerningian T (*Amphisa Gerningiana*).
No. 4.—The Vine T (*Œnectra Pilleriana*).
No. 5.—The Large Marbled T (*Sarrothripa revayana*).
No. 6.—The Caterpillar of the Large Marbled T.
No. 7.—The Cocoon of the Large Marbled T.
No. 8.—The Chrysalis of the Large Marbled T.
No. 9.—The Sprigged Green T (*Oxigrapha literana*).
No. 10.—The Button T (*Peronea cristana*).
No. 11.—The Rusty Rough-wing T (*Paramesia ferrugana.*)
No. 12.—The Notch-wing T (*Teras caudana*).
No. 12½.—The Winter T (*Cheimatophila mixtana*).
No. 13.—The Chequered Pebble T (*Dictyopteryx contaminana*).
No. 14.—The Holmian T (*Crocsia Holmiana*).
No. 15 and 16.—The Caterpillar of the Holmian T.
No. 17.—The Conwayian T (*Argyrotoza Conwayana*).
No. 18.—The Lechean T (*Ptycholoma Lecheana*).
No 19.—The Yellow-barred Iron T (*Eulia Ministrana*).

The genus *Lozotænia*. The insects assigned to this genus have the palpi rather longer than the head ; the anterior wings long and rather narrow, and, in front, arching strongly from the shoulder. In the males they have a crease or a fold reaching nearly to the middle. The hind margin is generally indented below the tip. The antennæ are either simple or very slightly pubescent. In the present arrangement of the genus *Lozotænia* of Stephens, there are fifteen British species, among which have been merged a series of insects formerly assigned to four separate genera ; and many of the species now represent numerous varieties formerly described as distinct species. In two of the species, *L. fulvana* and *L. Rosana*, the males and females are so different as to have been taken for different species. The Caterpillars feed between leaves webbed together, and are generally smooth and of rather sluggish character. The Chrysalis is also formed between leaves, sometimes in compactly webbed cocoons. The markings in all the species of this genus vary so much in intensity, in breadth, in continuity, and in the more or less diagonal direction of the bands, that the great number of species formerly made of the varieties is easily conceivable ; but it is probable, as the characters of all the varieties become better known, that the number of distinct species may be yet further reduced.

Lozotænia Sorbiana (the Hazel T, No. 1). This is the largest species, and in respect to general markings and character, may stand as the representative of the whole genus. The Caterpillar feeds on Oak, Hazel and other trees in May, and the moth appears in June, being far from rare. This species and nine others, *L. Forsterana*, *L. Dumetana*, *L. transitana*, *L. cinnamomeana*, *L. Heparana*, *L. Ribeana*, *L. Corylana*, *L. unifasciana*, and *L. piceana ;* each of which species is subject to variations many of which formerly ranked as separate species. The male and female of *L. piceana* for instance were made distinct species. The insects in the first section of the genus represent those agreeing with the character of Hübner's genus *Pandemis*.

The second section of this genus comprises the insects formerly assigned to Hübner's genus *Cacoecia*. There are five species in this section, *L. fulvana*, *L. roborana*, *L. Xylosteana*, *L. Rosana*, and *L. semialbana*. The sexes being so different in appearance in *roborana*, *fulvana*, and *Rosana*, as to have been formerly taken for distinct species, while the varieties which have received distinct specific names are also very numerous.

The third section of this genus is represented by a single species according in character with Hübner's genus *Philedone*, namely, *Lozotænia costana* (the Oblique Bar).

The fourth division also consists of a single species, which accords in general character with Hübner's genus *Nephodesme ;* this is *L. Branderiana* (the Branderian T).

The genus *Dichelia.* The insects assigned to this genus have the antennæ rather robust, but generally simple, or very slightly pubescent ; the fore wings are rather less in length than in the genus *Lozotænia ;* they are abruptly arched from the shoulder at the front edge. The hind wings are rather small. The Caterpillar is unknown. There is but one British species.

Dichelia Grotiana (the Grotian T, No. 2). This insect appears in June ; it is rather rare, and local, but is very widely distributed in the south of England.

The genus *Amphisa.* The insects assigned to this genus have the antennæ minutely pectinated, the palpi long, the fore wings of long proportion, and more lanceolate in the females than the males. The front of the wing is less arched at the shoulder than in other genera of this family. The Caterpillar is unknown. There are two British species.

Amphisa Gerningiana (the Gerningian T, No. 3). The Larva of this species is said to feed on Vaccinium, the Common Bilberry. The perfect insect appears in June, and again in September, and is found in the midland and northern counties, and in Scotland.

The other species, *A. prodromana* (the Early T), is easily distinguished by its gray colour.

The genus *Œnectra.* The insects assigned to this genus have the palpi very much longer than the head ; the anterior wings long in proportion to their breadth. The front of the wing strongly arched from the shoulder. There is but one British species.

Œnectra Pilleriana (the Vine T, No. 4). The Caterpillar of this species feeds upon the seeds of the Stinking Iris (*Iris fœtidissima*). The perfect insect appears in July, but is very scarce. It has recently been taken near Ventnor in the Isle of Wight.

The genus *Sarrothripa.* The insects assigned to this genus have the antennæ filiform in both sexes. The fore wings are of very long proportion, and much arched in front in springing from the shoulder. There is but one British species.

Sarrothripa revayana (the Large Marbled T, No. 5), is the *Tortrix degenerana* of Hübner. It is an extremely variable species, twelve of the most distinct looking varieties having been named as species by distinguished English and Continental entomologists. The Caterpillar (No. 6) feeds on the Sallow, forming a cocoon as shown at No. 7. The Chrysalis is represented without the cocoon at No. 8. The Moth appears in August and October, and sometimes as early as July, and as late as December. It is found near London, in the New Forest, and in other localities.

The genus *Oxigrapha.* The insects assigned to this genus have the palpi long and thickly clothed with scales. The fore wings are much waved at front edge, which is also partially clothed with hairs. The colour of the wings is generally green, or tinted with green, and they have raised tufts of scales. The Caterpillar is unknown. There are four British species.

Oxigrapha literana (the Sprigged Green T, No. 9). This is a most variable species, six of the varieties having received names as distinct species, several of these differing again so much as to have received several different names by different authors.

The other species are *O. Scotana,* which is of grayish tone ; *O. Scabrana,* which is also gray, but may be distinguished by the greater roughness of the wings caused by the raised tufts of scales ; and *O. Boscana,* which is of a much whiter tone than either of the other species.

The genus *Peronea.* The insects of which this genus is formed have the palpi twice as long as the head ; and the fore wings are more than twice as long as wide, and have generally a light streak along the back edge. They have also several tufts of raised scales, but have not the hairs along the front edge which distinguish the last genus. There are thirteen species in this genus, and all of them are so extremely variable, that without figuring each species, which is not within the province of this work, it is quite impossible to give an adequate idea of the specific differences, much more of the character of the endless varieties. I must therefore be content with giving a single example, selecting one which will best represent the general characteristics of the genus.

Peronea cristana (the Button T, No. 10), has a tuft of whitish scales in the centre of the fore wings in

addition to the long dash of the colour at their back edge. It appears in August and November, and is found in the New Forest, in Epping Forest, and in several woody districts in the southern counties. There are above thirty varieties that have received names as species. The allied species, *P. Hastiana*, is nearly as variable, and both these species are closely related to Hübner's genus *Eclectis*.

The other species are generally divided into the following sections, the first of which, agreeing with Hübner's genus *Lopas*, contains *P. umbrana*, *P. maccana*, and *P. rufana*. The second contains a single species (*P. Lipsiana*), agreeing with Hübner's genus *Acalla*. The third contains six species, agreeing with Hübner's genus *Acleris*. These are *P. favillaceana*, *P. Schalleriana*, *P. comparana*, *P. permutana*, *P. variegana*, and *P. cristana*; all exceedingly variable, and of very difficult definition.

The genus *Paramesia*. The insects assigned to this genus have the palpi very little longer than the head; the fore wings of elongate proportion, less strongly arched than in *Peronea* at the front edge as they spring from the shoulder, and they are slightly concave in the middle. They have raised tufts of scales like the last genus. The tail of the males is tufted. There are two British species.

Paramesia ferrugana (the Rusty Rough-wing T, No. 11). The Caterpillar of this species is pale green, with the head and second segment black or brownish. It feeds in curled Birch leaves in July and August. The Moth is found from July to October, and sometimes in the spring, being a very common species. There are four named varieties, once regarded as species.

The other species are *P. aspersana* (the Red Rough-wing T), which is more strongly marked with brown, and the female much smaller than the male, and *P. Shepherdana*.

The genus *Teras*. The insects in this group have the palpi rather long; the head is tufted in front, and the front wings have the unmistakable character of a semicircular notch or indent at the front edge, which appears artificially cut out, from which the group has received the expressive popular name of the Notch-wings. There is but one British species of the genus *Teras* now admitted in our Catalogues, all the others being at present considered mere varieties.

Teras caudana (the Notch-wing T). This curious insect, though rare near London, is tolerably common in the northern counties. The Caterpillar is pale green, with the head yellow. It feeds on Sallow. The varieties are numerous, and differ not only in markings, but even in the form and depth of the singular excavation at the edge of the front wing.

The genus *Cheimatophila*. The insects assigned to this genus have the wings glossy, the front edge straight, and are further distinguished by always appearing late in the autumn, or in the winter. There is only one species, which varies considerably in size.

Cheimatophila mixtana (the Winter T, No. 12½). This species is taken in the New Forest and some other localities, late in the autumn or in mid-winter.

The genus *Dictyopteryx*. The insects assigned to this genus have the palpi short, and the wings not notched at the front edge, but rather concave at the back. They are generally of a pale buff or yellowish colour with delicate pencillings.

Dictyopteryx contaminana (the Chequered Pebble T). The Caterpillar of this prettily chequered species is green with black spots; and the head is dark brown. It feeds within the stems of rushes, upon the pith. It is very abundant.

The closely allied species, *D. uliginosana*, with the preceding very nearly accords with the characters of M. Guénée's genus *Peronea*; while the two others, *D. Læflingiana* and *D. Forskaleana*, agree better with the characters assigned by the same author to the genus *Dictyopteryx*.

The genus *Cræsia*. The insects assigned to this genus have the palpi longer than the head; the fore wings rather long; the edge of the front wings arched in front, but nearly straight at the back. The Caterpillars are white, with black heads, and generally feed on the Rose, to the leaves of which they may often be seen suspending themselves by a silken thread.

Cræsia Holmiana (the Holmian T, No. 14). The Caterpillars of this species, Nos. 15 and 16, are represented as feeding on the foliage of the Rose, or suspended from it by a web. The Moth appears in June, and is common everywhere.

The other species, *C. Bergmanniana*, is easily distinguished by the absence of the conspicuous whitish spot at the front of the fore wings; instead of which the whole of the front wings are pale ochreous, with deeper pencillings, and two diagonal bands of pale silvery gray.

The genus *Argyrotoza*. The only British species assigned to this genus has the palpi about twice as long as the head; the wings not quite so elongated as those in the immediately preceding genera; the front line of the anterior wings regularly, but not abruptly, arched from the shoulder.

Argyrotoza Conwayana (the Conwayian T, No. 17). The Caterpillar of this species feeds on Privet, and the perfect insect, which appears in June, is widely distributed, and common everywhere.

The genus *Ptycholoma*. In this genus the palpi of the perfect insect are not longer than the head, and the antennæ also are short. The wings are of more elongated form than those of the last genus. The males have the front margin of the anterior wings singularly thickened. In Mr. Stainton's characters of this genus, he says the costa in the male is broadly folded to the middle, and then straight; in the female it is regularly arched. The wings are also distinguished by more or less distinct golden or silvery stripes or markings. There is but one British species.

Ptycholoma Lecheana (the Lechean T, No. 18). The dark wings of this species are distinguished by markings of a dull tarnished silvery character, which resemble in form the Greek letters ΙΓ, which, however, are scarcely traceable in some specimens, especially the females. The Caterpillar feeds on Oak in May, and the Moth appears in June and July, being very common.

The genus *Eulia*. The insects assigned to this genus have the palpi projecting slightly beyond the head; the body rather robust; the fore wings twice as long as broad, with the front edge regularly arched from the shoulder. There is but one British species.

Eulia Ministrana (the Yellow-barred Iron T, No. 19). The Caterpillar of this species is green, and is said to feed upon the Hazel. The Moth appears in June, and is generally common.


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PLATE L.

No. 1.—The Short-barred White T (*Brachylœnia Hartmanniana*).

No. 2.—The Gentian T (*Antithesia gentianana*).

No. 3.—The Caterpillar of the Gentian T.

No. 4.—The White-back T (*Penthina salicella*).

No. 5.—The Black-cloaked T (*Pardia tripunctana*).

No. 6.—The Caterpillar of the Black-cloaked T.

No. 7.—The Brown-cloaked T (*Spilonota roborana*).

No. 8.—The Caterpillar of the Brown-cloaked T.

No. 9.—The Beautiful Marbled T (*Lithographia nigromaculana*).

No. 10.—The Angle-barred Single Dot T (*Phlœodes immundana*).

No. 11.—The Lundian T (*Anchylopera Lundana*).

No. 12.—The Mottled Bran T (*Bactra furfurana*).

No. 13.—The Double Crescent T (*Cartolla bilunana*).

No. 14.—The Red Cross T (*Hypermecia augustana*).

No. 15.—The Red-bar T (*Ditula angustiorana*).

No. 16.—The Oblique-barred T (*Pœcilochroma profundana*).

No. 17.—The Solandrian T (*Pœcilochroma Solandriana*).

No. 18.—The Single Blotched T (*Halonota scutulana*).

No. 19.—The White-barred Elm T (*Anisotænia ulmana*).

No. 20.—The Wœberian T. (*Semasia Wœberana*).

No. 21.—The Caterpillar of the Wœberian T.

Nos. 22, 23, 24.—The Chrysales of the Wœberian T.

THE third Sub-Family of the *Tortricidæ* is composed of the *Penthinidi*, containing three genera, *Brachytænia*, *Antithesia*, and *Penthina*.

The genus *Brachytænia*. The insects assigned to this genus have the antennæ slender, but setaceous, and clothed beneath with scales. The anterior wings are nearly, but not quite, twice as long as broad. The waving of the bands is very marked, and angular. Some of the larvæ feed within the shoots of Sallow. There are two British species.

Brachytænia Hartmanniana (the Short-barred White, No. 1). This pretty species appears in July and August, and is found on the trunks of Willows, &c., near London, but is considered scarce.

The other species, *B. semifasciana*, may be easily distinguished by its generally darker colour, and th nterruption of the principal band, or fascia, which only extends half across the fore wings.

The genus *Antithesia*. In this genus the perfect insects have the palpi longer than the head, the thorax tufted, and the anterior wings rather more than twice as long as broad. The front of the wing is arched from the shoulder. There are fourteen British species, in one of which the sexes differ so considerably in their markings as to have been taken for distinct species.

Antithesia gentianana (the Gentian T, No. 2). This species belongs to the second division of this extensive genus, the insects assigned to which correspond closely in character with those of Stephens' genus *Endothenia*, while the first division have rather more affinity with those of Hübner's genus *Apotomis*. The species (*A. gentianoides*) gives a fair general idea, however, of the whole of the genus. It is said to be common near London. The Caterpillar (No. 3) appears in November and March, and is generally found in heads of the Teazle. The perfect insect appears in July, and is common in the south of England.

The other species are *A. corticana*, *A. Betulætana*, *A. Caprœana*, *A. ochroleucana*, *A. prælongana*, *sororculana*, *A. cynosbatella*, *A. Pruniana*, *A. dimidiana*, *A. sauciana*, *A. Grevilliana*, *A. Sellanana*, and *A. marginana*. The two last, like *gentianoides*, belonging to the section *Endothenia*.

The genus *Penthina*. In this genus the perfect insects have the antennæ simple, the thorax tufted, the anterior wings more than twice as long as broad, and in the front arching from the shoulder. There is but one British species.

Penthina Salicella (the White-back T, No. 4). This handsome species is not rare in favourable localities in the southern counties. The Caterpillar is described as dull reddish brown, with the head and next segment nearly black. It feeds in folded leaves of the Willow in May. The perfect insect appears in July and August.

The *Spilonotidi* form the fourth sub-family of the *Tortricidæ*, and contain two genera, *Pardia* and *Spilonta;* the last-named genus being subdivided into sections nearly according with Hübner's genera, *Hedya* and *Notocella*, and Stephens' *Phaneta*.

The genus *Pardia*. The insect assigned to this genus have the palpi longer than the head, the antennæ pubescent beneath, and the fore wings nearly twice as long as broad. The front of the fore wings is arched at the shoulder, and those of the males have a fold or crease as far as the middle. The Caterpillars are Rose feeders. There is but one British species.

Pardia tripunctana (the Black-cloaked T, No. 5). This species is very common, especially in gardens and along road-side hedges. The Caterpillar (No. 6) feeds on the foliage of the Rose, and the perfect insect appears very abundantly in July and August.

The genus *Spilonota*. The insects assigned to this genus have the palpi broadly compressed and longer than the head ; the abdomen tufted in the males ; the fore wings more than twice as long as broad, and deflexed when at rest ; the fold of the front wings reaches to the middle. The species, however, differ very considerably, and the genus has consequently been divided into sections, pretty nearly corresponding with Hübner's genera *Hedya* and *Notocella*, and Stephens' genus *Phaneta*, as previously observed. The species selected for illustration is taken from the section *Hedya*, as best illustrating the character of the genus in general, the other two sections containing but one British species each. There are in all ten British species.

Spilonta roborana (the Brown-cloaked T, No. 7). This species is very plentiful and a great garden pest, the Caterpillar (No. 8) feeding upon the young shoots and buds of the Rose. The Caterpillar commences its ravages in April and May, and the moth appears in June and July. The other species in the first section (*Hedya*) are *S. rosæcolana* (the Rose Brown-cloak T), *S. trimaculana* (the Triple-blotched T), *S. amœnana* (the Pretty Short-cloak T), *S. neglectana* (the Neglected Short-cloak T), *S. dealbana* (the White Short-cloak T) *S. Alnetana* (the Alder Short-cloak T), and *S. Aceriana* (the Maple Short-cloak T). In the second section (*Notocella*) the single species is *S. ocellana* (the Cream Short-cloak T), and in the third section (*Phaneta*) the single species is *S. pauperana* (the Early Short-cloak T).

The fifth sub-family of the *Tortricidæ* is composed of the *Grapholithidi*. This sub-family contains the following genera: *Lithographia*, *Phlœodes*, *Anchylopera*, *Bactra*, *Cartella*, *Hypermecia*, *Ditula*, *Pœcilochroma*, *Halonota*, *Anisotœnia*, *Semasia*, *Coccyx*, *Heusimene*, *Pamplusia*, *Retinia*, *Carpocapsa*, *Opadia*, *Endopisa*, *Ephippiphora*, *Dicrorampha*, *Eucelis*, *Hemerosia*, *Grapholita*, and *Thcodia*. Many of these genera containing a great number of species, often of such divergent character as to render it necessary to divide the genera into several sections.

The genus *Lithographia*. The insects assigned to this genus have the palpi longer than the head, and the anterior wings remarkably narrow, being nearly three times as long as broad. There are twelve British species, classed into four sections, all of which are subject to variation, especially *L. nisella* (the Poplar Blotch-back T), of which there are seven or more varieties which have been ranked as species.

Lithographia nigromaculana (the Beautiful Marbled T, No. 9). This pretty insect, with its anterior wings so brightly mottled with dark marks and specks upon a white ground, is very rare and yet widely dispersed, having been taken both in Ireland and Scotland, as well as in many parts of England. It appears about the end of July.

The other species are, in the first section (*Notocella*) *L. Paykulliana* (the Paykullian T); *L. nisella* (the Poplar Blotch-back T); *L. cinerana* (the Mottled Gray T); *L. Campoliliana* (the Reeluse Marbled T). In the second section (*Asthenia*) there is but one species, *L. minutana* (the Brindled Marbled T). In the third section

(*Phiaris*) there are four species, *L. trimaculana* (the Elm Marbled T), *L. excruciana* (the Dingy Red T), *L. Penkleriana* (the Variable Red T), and *L. obtusana* (the Blunt-winged Blotch-back T). In the fourth section (*Eudemis*) there are two species, *L. nævana* (the Marbled Single Dot T), and *L. geminana* (the Twin-Spot Single Dot T).

The genus *Phlæodes*. The general structural characters of this genus closely resemble those of the last, but the markings on examination of the species selected for illustration, will be found to be tolerably distinct. The palpi are longer than the head, the fore wings three times as long as broad, and have a fold reaching half their length. There are four British species.

Phlæodes immundana (the Angle-barred Single Dot T, No. 10), The Caterpillar of this species is greenish-gray, with the head brownish. It feeds upon the foliage of the Birch, in rolled leaves ; there are two broods ; the perfect insect appearing in April and May, and again in September and October. It is rather scarce, but very widely distributed.

The other species are *P. tetraquetrana* (the Single Dot T), *P. Demarniana* (the Blotched Single Dot T), and *P. crenana* (the Notched Single Dot T).

The genus *Anchylopera*. The insects assigned to this genus have the antennæ filiform ; the palpi shorter than the head ; the fore wings rather more than twice as long as broad, the tip being sometimes rather hooked, as implied by the generic name.

There are twelve British species, which vary much less than those of many of the preceding genera ; but they are in some cases so distinct that it has been found convenient to divide the genus into two sections.

Anchylopera Lundana (the Lundian T, No. 11). This pretty and characteristic insect belongs to the typical section of the genus. It is double brooded, being found in May, and again in September. The Caterpillar, which feeds upon the leaves of the Meadow Veteh webbed together, is described as being of a greenish gray, with the head yellowish brown, and the second segment pale. The perfect insect is common, and very generally distributed.

The other species of the typical section (*Anchylopera*) are *A. Upupana* (the Dark Hook-tip T), *A. Mitterbacheriana* (the Red Hook-tip T), *A. diminutana* (the Festoon T), *A. derasana* (the Hook-tip Blotch-back T), *A. Myrtillana* (the Myrtle T), *A. comptana* (the Delicate Hook-tip T), *A. biarcuana* (the Double Arched T), *A. uncana* (the Bridge T), *A. unguicella* (the Heath Hook-tip T), *A. siculana* (the Hook-tipped Streak T). The other section (*Philacca*) contains but one species, *A. Ramella* (the Hooked Marble T), the markings of which are of a distinct character, and the hook-tip of the anterior wings less marked.

The genus *Bactra*. The insects assigned to this genus have the antennæ simple, the palpi longer than the head ; the fore wings more than twice as long as broad, and the tip acute. The Caterpillars of some of the species are sap feeders, generally in rushes. Some of the species vary exceedingly, especially *B. lanceolana*, four of the varieties of which formerly made distinct species. There are three British species.

Bactra furfurana (the Mottled Bran T, No. 12). This species appears in June, but it is rare and local ; at the same time it is widely distributed, being found in the southern counties, and as far north as Edinburgh.

The genus *Cartella*. The insects assigned to this genus have the palpi much longer than the head, and the fore wings of very long proportion, being nearly three times as long as broad. The front of the anterior wings is arched at the shoulder, and the fold in the wings of the male extends about one third of the entire length of the wing.

The Caterpillars feed in the catkins of the Birch.

Cartella bilunana (the Double Crescent T, No. 13). The Caterpillar has not been accurately described, but is said to feed in the catkins of Birch in April. The perfect insect appears in June, and is not uncommon.

The genus *Hypermecia*. The insects assigned to this genus have the antennæ simple and the palpi longer than the head ; the anterior wings are of narrow proportion, and they are scarcely arched at their front edge, at the shoulder. There is but one British species.

Hypermecia augustana (the Red Cross T, No. 14). The Caterpillar of this species is described as pale

yellow with minute specks; the head being black, and the second segment pale brown. It feeds in May and June upon the foliage of several kinds of Willow, drawing the leaves together by a web. The perfect insect appears in June and July, and is common almost everywhere.

The genus *Ditula*. The insects assigned to this genus have the palpi projecting slightly beyond the head, the antennæ of the male pubescent; the body rather robust; the fore wings rather more than twice as long as broad. The front of the fore wings is arched at the shoulder, and those of the male have a conspicuous fold at the base. There is but one British species.

Ditula angustiorana (the Red Bar T, No. 15). The Caterpillar is described as greenish-gray, the head being dark green. It feeds on various trees and shrubs in April and May, and the perfect insect appears in July and August. It is common almost everywhere.

The genus *Pœcilochroma*. The insects assigned to this genus have the palpi longer than the head; the wings are rather narrow, being about twice as long as broad, and deflexed when at rest. There are, however, considerable discrepancies in the species now assigned to this genus, and they are consequently arranged in three sections. The first section (having affinities with the genus *Ditula*) contains one species only. The second section (having affinities with the genus *Zeiraphera* of Curtis) also contains only one species. The third section (having affinities with the genus *Acalla* of Hübner) contains four species. The fourth section (having affinities with the genus *Astatia* of Hübner) contains four species.

The first section (*Ditula*), *Pœcilochroma profundana* (the Oblique-barred T, No. 16). The representation is that of a typical specimen of this species, of which there are several distinct varieties, ten having been named at different times as distinct species. The perfect moth appears in June and again in September, being double brooded. It is common in the southern and midland counties.

The second section (*Zeiraphera*) contains but one British species: *P. corticana* (the Cock's-head T).

The third section (*Acalla*) contains, *P. ophthalmicana* (the Black Double-blotched T), *P. oppressana* (the Obscure Blotch-back T), *P. occultana* (the Dingy Blotch-back T), and *P. signatana*, (the Black Blotched T).

The fourth section (*Astatia*), contains *P. Solandriana* (the Solandrian T), represented at No. 17, and three other species. *P. Solandriana*, by some writers placed in another genus, is found in July and August. The larva is described as dirty white, with a tinge of green; the head and second segment black. It feeds on Hazel and Birch in May. The Moth is common almost everywhere.

The other species in this section are *P. Brunnichana* (the Brunnichian T), of which there are many distinct varieties, *P. stabilana* (the Clouded Willow T), and *P. Piccana* (the Shining Pitch T).

The genus *Halonota*. The insects assigned to this genus have the palpi longer than the head, the antennæ simple, the fore wings rather more than twice as long as broad, and the front arched beyond the fold, in the male. This genus contains thirteen species, divided into the sections, 1. (*Epinotia,*) containing two species, *H. bimaculana*, and *H. cirsiana;* 2. (*Epiblema,*) containing eight species, *H. scutulana*, *H. novana*, *H. Brunnichiana*, *H. turridana*, *H. Fœnella*, *H. trigeminana*, *H. costipunctana*, and *H. tetragonana*. The third section (*Hemimene*) contains three species, *H. populana*, *H. nigricostana*, and *H. obscurana*.

Halonota scutulana (the Single Blotched T, No. 18). I have selected this species, belonging to the second section, to represent the whole genus, which it does very inadequately; but the space of my work forbids farther illustration. It appears in June and July, and is widely distributed and rather common. The Caterpillar is described as bright pink, with the head and second segment black, and as feeding in the stems of Thistles in October, and in May, being double brooded.

The genus *Anisotænia*. The insects assigned to this genus have the antennæ longer than the head. The wings long and narrow, the anterior pair being more than twice as long as broad; the front arched at the shoulder, and the front angle rather rounded.

Anisotænia Ulmana (the White-barred Elm T, No. 19). The Caterpillar of this species is, as yet, undescribed, but the Moth, though not common, is very widely distributed, and appears in June and July.

The genus *Semasia*. The insects assigned to this have the palpi longer than the head; the antennæ simple; the anterior wings twice as long as broad, and their front angle rather rounded. The species are,

however, not very homogeneous, and are, therefore, divided into three sections :—1. *Semasia;* 2. *Aspila;* and 3. *Enarmonia*: the insects assigned to the last section having metallic or gold-like marks on the wings.

Section 1 contains *S. spiniana* (the White Triangle T).

Section 2, *S. Janthinana* (the Purple-shades T), and *S. rufillana* (the Dark Purple Shades T).

Section 3, *S. Wæberana* (the Wœberian T, No. 20). The Caterpillar of this species (No. 21) is found under the bark of various trees, upon the inner tegument of which it appears to feed. It prefers the Apple, Plum, or Cherry, but is also found on the Laurel. The perfect insect, which is easily distinguished by the gold-like marks on the anterior wings, appears in May, and again in September, and is common almost everywhere.

The Chrysalis (Nos. 22 to 24) is attached to the bark in stiff cocoons of a yellowish colour.


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PLATE LI.

No. 1.—The Large Dark Silver-striped T (*Coccyx Strobilella*).

No. 2.—The Brown-bordered T (*Heusimene fimbriana*).

No. 3.—The Faint Silver-striped T (*Pamplusia monticolana*).

No. 4.—The Silver-striped Orange Spot T (*Retinia Buoliana.*)

No. 5.—The Caterpillar of the Silver-striped Orange Spot T.

No. 6.—The Chrysalis of the Silver-striped Orange Spot T.

No. 7.—Moth at rest of the Silver-striped Orange Spot T.

No. 8.—The Codling T (*Carpocapsa pomonella*).

No. 9.—The Caterpillar of the Codling T.

No. 10.—The Plum-tree T (*Opadia funebrana*).

No. 11.—The Black Striped-edge T (*Endopisa nigricana*).

No. 12.—The Yellow Blotch-backed T (*Ephippiphora regiana*).

No. 13.—The Petiverian T (*Dichrorampha Petiverella*).

No. 14.—The Double Orange Spot T (*Eucelis aurana*).

No. 15.—The Rhœdian T (*Hemirosia Rhœdiella*).

No. 16.—The Brown-cloaked T (*Grapholita Albersana*).

No. 17.—The Lemon T (*Thiodia citrana*).

The genus *Coccyx*. The insects assigned to this genus consist in great part of that pretty group of small Moths popularly known as the Silver-Lines, which are so named from having several extremely fine silvery lines running along the front nervures of the anterior wings. The species assigned to the three divisions of the genus *Coccyx* have the palpi scarcely longer than the head; the front wings about twice as long as broad, and the front slightly arched at the shoulder. There are ten species, divided into three sections.

Coccyx Strobilella (the Large Dark Silver-striped T, No. 1). It is impossible in a drawing to render distinctly the slight silvery streaks of the front of the fore wings which distinguish this species, like others of the group. The other markings will, however, render it sufficiently recognisable. The Caterpillar is pale yellow, and has the head pale brown. It feeds on the seeds of Fir-cones in October and April. The perfect insect appears in May, and generally found in Fir plantations, but is rather rare. It has recently been taken at West Wickham, Croydon, and other places near London.

C. Strobilella belongs to the first section of the genus *Coccyx* (*Hemimene*), which contains three other species of more or less characteristic resemblance to each other. *C. cosmophorana*, *C. splendidulana*, *C. argyrana*, and *C. finitimana*. The next section (*Astheria*) contains but one species, *C. pygmæana*. The third section, *Evetria*, contains four species: *C. Hyrciniana*, *C. ustomaculana*, *C. nanana*, and *C. Vacciniana*.

The genus *Heusimene*. In this genus the perfect Moth has the palpi the same length as the head, the wings extremely long and narrow; the front of the wings nearly straight, and the front angle rather sharp. There is only one British species.

Heusimene fimbriana (the Brown-bordered T, No. 2). This is an early insect, being generally found in March and April, in the neighbourhood of Oaks, upon which it is probable that the Caterpillar feeds; but it remains as yet undescribed. The Moth is far from common, though very widely distributed.

The genus *Pamplusia*. The insects assigned to this genus have the antennæ simple, the palpi rather longer than the head, and the wings very long and narrow, being three times as long as broad, and having the front nearly straight at the shoulder. There are two British species.

Pamplusia monticolana (the Faint Silver-striped T, No. 3). This is a northern insect, being most abundant in moors and highlands in the North of England, where it is found in July and August. The Caterpillar is unknown.

The other species is *P. Alticolana* (the Mountain Silver-striped T).

The genus *Retinia.* The insects assigned to this genus have the palpi rather longer than the head, and he front wings more than twice as long as broad. There are five species divided into two sections.

Retinia Buoliana (the Silver-striped Orange Spot T, No. 4). The Caterpillar of this species (No. 5) feeds ıpon the young shoots of the Scotch Fir in May, to which it is very injurious. The Chrysalis (No. 6) is generally attached to a portion of the shoot which has been destroyed by the Caterpillar. The Moth appears ı July and August, and is very common, and very generally distributed. No. 7 represents a Moth in repose, ı which state the position of the wings is very characteristic.

The other species in the first section (*Rhyacionia*) of the genus *Retinia* are, *R. Pinicolana*, *R. Turionella*, *R. Pinivorana.*

In the second section (*Evertria*) there is only one species, *R. sylvestrana.*

The genus *Carpocapsa.* The insects assigned to this genus have the palpi rather longer than the head. The front wings are more than twice as long as broad, and are slightly arched at the shoulder in front, and become suddenly concave at the back, within the posterior angle. The wings of some of the species are ornamented with small metallic patches. There are two British species, placed in two separate sections of the genus. All the known Caterpillars of this genus feed in the interior of fruits.

Carpocapsa pomonella (the Codling T, No. 8). This species is the only one belonging to the second section of ıe genus, (*Cydia*). The Caterpillar (No. 9) feeds within the fruit of the Apple, causing it to fall prematurely, ıd thus causing much damage in Apple orchards. The perfect insect appears in June and July, and is found in ardens and orchards, but not very abundantly except in some districts.

In the first section of *Carpocapsa*, (*Enarmonia*) the two British species are *C. splendana* (the Bright Marble T), and *C. grossana* (the Smoky Marble T); both have the metallic markings similar to those of *C. pomonella*, though sometimes much more obscurely defined.

The genus *Opadia.* The general characters of this genus resemble so closely those of the last-described enus (*Carpocapsa*) that some writers place the only British *Opadia* in that genus. The wings however are arrower, with a stronger indent behind the apex of the fringed edge, and are of more obscure colouring and arkings.

Opadia funebrana (the Plum-tree T, No. 10). The Caterpillar of this species feeds within the pulp of ıe Plum in August and September; it is of a pale red, with a black head, and the second segment pale brown. he Moth appears in July. It is taken about London, and Cambridge; but this species is scarce in the perfect ate, though Mr. Stainton remarks that in its Caterpillar stage it is exceedingly plentiful in Plum pies.

The genus *Endopisa.* The insects assigned to this genus have the antennæ simple, but rather robust. he palpi are rather longer than the head. The front wings are rather more than twice as long as broad, and in ıe only British species are nearly black, with the exception of a few light orange-brown marks above the front lge near the external angle.

Endopisa nigricana (the Black Striped-edge T, No. 11). This insect, the glossy black wings of which, ith their silvery fringe, make it very remarkable, is taken in woods and hedges in June, but is not very undant.

The genus *Ephippiphora.* The insects assigned to this genus have the palpi slightly longer than the head. ıe fore wings are of long proportion, being rather more than twice as long as broad; and have generally a light atch on the inner margin of the front wings. There are fifteen British species, divided into five sections.

Ephippiphora regiana (the Yellow Blotch-backed T, No. 12). The larva of this pretty species is dirty hite, with the head pale brown, and the second segment pale orange; it is also speckled with black. It feeds ıder the bark of the Sycamore in September and October, and the moth appears in June and July. It is widely stributed, and rather common in the southern counties.

E. regiana belongs to the second section of the genus (*Pammene*), the only other species belonging to which *E. Trauniana.*

The first section of the genus contains *E. Germarana* and *E. puncticostana.*

The third section of the genus, (*Aspila*) contains *E. nitidana* and *E. Weirana.*

The fourth section of the genus (*Hemimene*) contains *E. Lathyrana*, *E. compositella*, *E. internana*, and *E. perlepidana*.

The fifth section of the genus (*Selanea*) contains *E. Leplastriana*, *E. Heegerana*, *E. coniferana*, *E. fissana*, and *E. Dorsana*.

The genus *Dichrorampha*. This genus, established by M. Guénée, contains eleven British species of well-defined and tolerably homogeneous character. The antennæ of the perfect insect are simple, the palpi rather longer than the head. The anterior wings are twice as long as broad, and have the hind margin indented before the external angle. The fold in the fore wings of the males is half the length of the wings. The Caterpillars, as far as known, are root feeders.

Dichrorampha Petiverella (the Petiverian T, No 13). The caterpillar of this pretty species feeds on the roots of the Millefoil (*Achillea millefolia*). It is pinkish-white, with the head brownish, and is found in April, and again in November. The Moth appears in June and July, and is very generally distributed and very common.

The other species are, *D. Sequana* (the Silver Blotch T), *D. Politana* (the Shining Blotch-back T, *D. alpinana* (the Gold-fringed T), *D. simpliciana* (the Plain Silver-fringed T), *D. acuminatana* (the Dark Silver-fringed T), *D. saturnana* (the Dingy T), *D. plumbagana* (the Leaden-fringed T), *D. ulicana* (the Furze T), *D. consortana* (the Dwarf T).

The genus *Eucelis*. The insects assigned to this genus have the palpi much longer than the head. The front edge of the fore wings arched at the shoulder, and rather more than twice as long as broad. There is but one British species.

Eucelis aurana (the Double Orange-spot T, No. 14). This pretty insect appears in June and July, especially in the bright sunshine, where the common *Umbelliferæ* are abundant, such as the Cow-parsnip, &c. It is found near London, and as far north as Renfrewshire.

The genus *Hemerosia*. The insects assigned to this genus have the antennæ remarkably robust, and the palpi long and extending considerably beyond the head. The wings are twice as long as broad, and arched at the front edge towards the shoulder. There is but one British species.

Hemerosia Rheediella (the Rheedian T, No. 15). The Caterpillar of this species feeds on the foliage of the Apple and Hawthorn. The Moth appears in May and June, and is widely distributed, though not very common.

The genus *Grapholita*. Many of the insects now assigned to this extensive genus were formerly included in the genus *Carpocapsa*. They are distinguished by slender and simple antennæ, the palpi longer than the head, the wings twice as long as broad, and by the characteristic markings. There are thirteen British species assigned to this genus in the system which I am following.

Grapholita Albersana (the Brown-cloaked T, No. 16). The Caterpillar of this species feeds on the folded leaves of the common Woodbine in August. The perfect insect appears in May and June. It is rarely found in the middle or more northerly counties, but is widely distributed in more southern localities.

The other species are *G. Ulicetana*, which flies in swarms about Furze-bushes in May and August; *G. asseclana*; *G. Juliana*; *G. Hypericana*, the Caterpillars of which feed on Hypericum; *G. Wimmerana*, which is rare, and the Caterpillars of which feed on Sea Wormwood; *G. Lacteana*; *G. Scopoliana*; *G. Hohenwarthana*; *G. Æmulana*; *G. cæcimaculana*; *G. expallidana*; and *G. pupillana*, the Caterpillars of which feed in the roots of Artemisia maritima on the south coast.

The genus *Thiodia*. The insects assigned to this genus have their antennæ simple, the palpi rather longer than the head, the wings moderately broad for this group, and the colour generally of different shades of subdued orange or yellow. There is only one British species.

Thiodia citrana (the Lemon T, No. 17). This rare insect has been taken at Southend (Essex) and Lytham (Lancashire), in places where the Rest-harrow is abundant.


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PLATE LII.

No. 1.—The Jaundiced Drab T (*Sphaleroptera ictericana*).
No. 2.—The Eight-spotted T (*Cnephasia Penziana*).
No. 3.—The Afternoon T (*Syndemis musculana*).
No. 4.—The Beautiful Rough-wing T (*Phtheochroa rugosana*).
No. 5.—The Red-barred Gray T (*Argyrotænia politana*).
No. 6.—The Brindled T (*Eriopsela quadrana*).
No. 7.—The Pale Clay T (*Capua ochraceana*).
No. 8.—The Rustic T (*Clepsis rusticana*).
No. 9.—The Dotted Drab T (*Ablabia pratana*).
No. 10.—The Clouded Winter T (*Tortricodes hyemana*).

THE sixth sub-family of the *Tortricidæ* is that of the *Sciaphilidi* containing ten genera, the whole of which are illustrated in the present Plate. Among them are some of the commonest of our small Moths, some of which appear in thousands in their season, but a few are rare.

The genus *Sphaleroptera*. The insects assigned to this genus have the palpi projecting beyond the head, and the proportion of the anterior wings is nearly three times as long as broad. The wings of the female are of shorter proportion, and nearly straight in front, those of the males being curved.

Sphaleroptera ictericana (the Jaundiced Drab T, No. 1). This species, which has been recently separated from the genus *Cnephasia*, is very inconspicuous, the colour of the wings being of a pale drab colour unvaried by any markings beyond a slight mottle of a deeper tone of the same colour. The female is rather more strongly marked with a pale brown.

The Caterpillar is found upon all kinds of plants, and is abundant in May, June and July. The perfect insect appears in June and July, and is very common in the neighbourhood of London.

The genus *Cnephasia*. The insects assigned to this genus have the palpi rather longer than the head, and the wings of considerably shorter proportions than those of the preceding genus, being scarcely more than twice as long as broad. The front of the wings is slightly arched in the male and more strongly in the female. There are fifteen species, divided into two sections, fourteen being placed in the division "*Syndemis*," and one in the division "*Eudemis*," as approaching in character to those genera as defined by Hübner.

Cnephasia Octomaculana (the Eight-spotted T, No. 2). This is one of the handsomest species, and not being found in the southern counties has long been considered a choice variety by London collectors. The Caterpillar is unknown, but it probably feeds upon Lichens, as the Moth is found in rocky places where they abound. The perfect insect appears in the north of England in July, and has been taken at Edinburgh, at Ardrossan, and in North Wales.

The other species are, in the first section, *C. decolorana*, *C. perterana*, *C. obsoletana*, *C. passivana*, *C. subjectana*, *C. Virgaureana*, *C. alternella*, *C. perplexana*, *C. sinuana*, *C. cretaceana*, *C. Penziana*, *C. incana*, and *C. hybridana*. Among these, *subjectana* and *Virgaureana* occur by thousands, and are far from attractive in their colour or markings; but the other northern species, *C. Penziana*, is very handsome and as conspicuous as *C. Octomaculana* (No. 2). In the second division *C. Nubilana* is a common unattractive insect which is a perfect pest from its great numbers.

The genus *Syndemis*. The single British species assigned to this genus of Hübner's is by some English

authors still retained in the genus *Lozotænia*, with the general character of which the form of the fore-wings, strongly arched at the shoulder, give it an apparent affinity, while other characters seem to warrant its being assigned to its present position.

Syndemis musculana (the Afternoon T, No. 3). This is an extremely abundant species, common everywhere. The Caterpillar feeds in rolled leaves of Bramble in October, and the perfect insect appears in the following May.

The genus *Phtheochroa*. The insects assigned to this genus have the palpi of rather long proportions, the anterior wings about twice as long as broad, with the front nearly straight, but slightly arched at the shoulder. The margins of the wings of the female are more indented towards the tip than those of the male. There are tufts of scales on the anterior wings which have suggested the specific name *rugosana* for the only British species.

Phtheochroa rugosana (the Beautiful Rough-wing T, No. 4). The Caterpillar of this species feeds on the Bryony (*Bryonia dioica*) in September ; the perfect insect appearing in the following May and June. It is found fluttering over hedges in which Bryony is growing, and in the southern counties is far from uncommon. There is a bright pinkish flush in very fresh specimens which soon fades. This pretty species may be recognised at once on the wing by its slow flight, and its comparatively large size and light appearance.

The genus *Argyrotænia*. The insects assigned to this genus have the palpi scarcely projecting beyond the head, and the wings scarcely twice as long as broad. In other respects also they differ from the genus *Sericoris* with which they were formerly classed, and in which some authors still retain them. There are three British species.

Argyrotænia politana (the Red-barred Grey T, No. 5). The Caterpillar of this pretty little species feeds upon *Myrica gale ;* the perfect insect appearing in June and July. It is found to be widely distributed on moors and high barren grounds, though formerly only supposed to be taken in the New Forest and at one or two places in Devonshire.

The other species are *A. cognatana* and *A. fuscociliana*.

The genus *Eriopsela*. The insects assigned to this genus have the palpi conspicuously longer than the head, the fore-wings rather more than twice as long as broad, nearly straight in front, and form a somewhat acute angle at the external point. The hind-wings are indented within the tip. There are only two British species.

Eriopsela quadrana (the Brindled T, No. 6). The Caterpillar of this species remains undescribed. The perfect insect appears in May, but is rare; West Wickham, Stoat's Nest, &c., being among the few places where it has been recently taken. The undersides of the hind-wings of this species are whitish, speckled with gray at the edges.

The other species, *E. fractifasciana*, closely resembles the preceding, but may be distinguished by the under sides of the hind-wings, which instead of being whitish are entirely gray.

The genus *Capua*. The insects assigned to this genus have the palpi short and slender, scarcely longer than the head ; and the antennæ of the males are strongly pubescent. The fore-wings are twice as long as wide, and in the males have a fold which reaches about half their length. There is only one British species.

Capua ochraceana (the Pale Clay T, No. 7). The Caterpillars of this genus are said to feed on the foliage of the Hornbeam ; the perfect insect appearing in May and June. It is widely dispersed, and not scarce. The New Forest was formerly considered the best place for its capture.

The genus *Clepsis*. The only British species assigned to this genus has the palpi slender and twice as long as the head. The anterior wings are nearly twice as long as broad, and the front edges slightly arched at the shoulders.

Clepsis rusticana (the Rustic T, No. 8). The Caterpillar of this species is unknown. The perfect insect appears in June, and is generally found in fens or on marshy commons, where it is far from rare.

The seventh sub-family of the *Tortricidæ* is that of the *Aphelidi*, which contains but two British genera, *Ablabia* and *Tortricodes*.

The genus *Ablabia*. The single British species assigned to this genus has the palpi slender and much longer

than the head. The anterior wings are very long and narrow, being in length nearly three times their breadth. The wings are dark and almost without markings.

Ablabia pratana (the Dotted Drab T, No. 9). The Caterpillar of this species is unknown. The perfect Moth appears in July and August, and is very common. It is also very widely dispersed, and may be taken almost everywhere from Dover to Edinburgh. The slight and imperfect markings of the wings vary very much both in number and intensity.

The genus *Tortricodes*. The palpi of the insects assigned to this genus are short and pointing downwards. The anterior wings are of long proportion like those of the last genus, and generally of obscure colour, and have very indistinct markings, or none at all.

Tortricodes hyemana (the Clouded Winter T, No. 10). The Caterpillar of this obscure species is unknown. The perfect Moth appears in the early spring in woods, but is not common.


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PLATE LIII.

No. 1.—The Tawney-dotted T (*Euchromia fulvipunctana*).
No. 2.—The Straight-barred T (*Orthotœnia striana*).
No. 3.—The Udmannian T (*Notocella Udmanniana*).
No. 4.—The Marbled Dog's-tooth T (*Sideria Achatana*).
No. 5.—The Silver-striped T (*Sericoris conchana*).
No. 6.—The Schulzian T (*Mixodia Schulziana*).
No. 7.—The Arched T (*Roxana arcuana*).
No. 8.—The Orange and Black T (*Lobesia reliquana*).
No. 9.—The Servillian T (*Cerata Servillana*).
No. 10.—The Tessellated T (*Chrosis tesserana*).
No. 11.—The Scarlet-barred Gold T (*Dapsilia rutilana*).
No. 12.—The Burdock T (*Argyrolepia badiana*).
No. 13.—The Doubtful T (*Eupœcilia dubitana*).
No. 14.—The Orange-barred Pearl T (*Argyridia dipoltella*).
No. 15.—The Littoral Straw T (*Logopera alternana*).
No. 16.—The Zægian T (*Xanthosetia Zœgana*).

The eighth sub-family of the *Tortricidæ* is that of the *Sericoridi* containing seven genera, *Euchromia*, *Orthotœnia*, *Notocella*, *Sideria*, *Sericoris*, *Mixodia* and *Roxana*.

The genus *Euchromia*. The insects assigned to this genus have the palpi projecting considerably beyond the head. The anterior wings are about twice as long as wide; the front edge being regularly arched, and the apex rather pointed. There are three British species, representing two sections. The first is distinguished by the title *Argyroploce* as partially corresponding with Hübner's genus of that name, and the second distinguished by the term *Euchromia* as approaching the genus established by Stephens.

Euchromia fulvipunctana (the Tawney-dotted T, No. 1). This species belongs to the second division. The Caterpillar is dark reddish brown with a black head, and feeds upon the common Bilberry (*Vaccinium Vitis idœa*) in May. The Moth appears in June and July. It is a northern species, and common on moors in the northern counties and in Scotland.

The other species in the same section of the genus is *E. purpurana*, a scarce insect, so named from the dull rosy tone of the front wings. In the division *Argyroploce* the only species is *E. arbutella*, which like *fulvipunctana* may be considered a northern species.

The genus *Orthotœnia*. The two of the three species now assigned to Stephens' genus *Orthotœnia* are by some authors placed in the genus *Euchromia*, which their characters in some degree justify, while one or more were formerly located in the genus *Sericoris*. The characters of the insects here assigned to the genus *Orthotœnia* are—palpi twice as long as the head, fore-wings more than twice as long as wide, front edge regularly arched, apex obtuse.

Orthotœnia striana (the Straight-barred T, No. 2). This insect in the perfect form frequents hedges about the middle of June, and is rather common, being sometimes very abundant in the southern counties. The other species are, first, *O. Ericetana* (the Heath T,) originally taken by Mr. Bentley in the north of England, but since at Shanklin in the Isle of Wight, Bristol, &c. Secondly, *O. antiquana*, which is widely distributed, but nowhere common.

The genus *Notocella*. The insects assigned to this genus have the palpi very short and bent downwards. The antennæ of the males are slightly serrated. The fore-wings are broader and shorter than in the neighbouring genera. There is but one British species.

Notocella Udmanniana (the Udmannian T, No. 3.) The Caterpillar of this species is unknown. The perfect Moth appears in June and is widely dispersed. It is not uncommon in woods or woody lanes.

The genus *Sideria.* The insects assigned to this genus have the palpi of moderate length, the anterior wings of long proportion, the front edge regularly arched, and the fringed edge indented behind the tip. There is only one British species.

Sideria Achatana (the Marbled Dog's-tooth T, No. 4). The Caterpillar of this species is unknown. The perfect insect appears in June and July, and is not scarce in the south of England, especially where Hawthorn abounds, which is probably the food of the larvæ.

The genus *Sericoris.* The insects assigned to this species have the palpi rather short and only slightly projecting beyond the head. The wings are rather broad, but the anterior pair are twice as long as broad, the body is long, and in the males tufted. The females are smaller than the other sex. There are 14 British species still retained in this genus, and they are divided into three divisions, the first distinguished as "*Celypha*;" the second, *Phiaris*, and the third *Eudemis*, respectively so named on account of the insects assigned to each division approaching in character three genera established by Hübner.

Sericoris conchana (the Silver-striped T, No. 5). This insect belongs to the first division of the genus (*Celypha*). The Caterpillar is unknown. The perfect Moth appears in July and is widely dispersed, being found in many widely distant places, from the New Forest to the north of Perthshire.

The other species in this division are *S. Herbana*, *S. Lacunana*, *S. Urticana* and *S. alternana.* In the second division (*Phiaris*) there are *S. micana* and *S. Bistrigana.* In the third and last division (*Eudemis*) there are *S. fuligana*, *S. latifasciana*, *S. Dormoyana*, *S. Euphorbiana*, *S. bifasciana*, *S. litoralis*, and *S. cespitana.*

The genus *Mixodia.* The insects assigned to this genus have the palpi rather longer than the head, and the wings nearly twice as long as broad; the front edge being slightly but regularly arched, and the tip rather pointed. There are three British species.

Mixodia Schulziana (the Schulzian T, No. 6). This pretty insect is by no means rare if sought in the right localities, namely, the Moors and High Heathy districts of the north of England and Scotland. It has also been taken near Weybridge, in Surrey. The time of the appearance of the Caterpillar is unknown, but the Moth appears in June and July.

The other two species are *M. palustrana* and *M. Tenerana. Palustrana* may be easily distinguished by its smaller size and the deeper brown of its markings.

The genus *Roxana.* In this genus the perfect insects have the palpi longer than the head, and the wings more than twice as long as broad; the front edge of the wings being very slightly arched and the apex rather obtuse. There is but one British species.

Roxana arcuana (the Arched T, No. 7). The Caterpillar is unknown. The Moth appears in woods about the end of June; but by some it is said to be double-brooded, and to appear in May and again in August. Greenhithe, Hampstead, New Forest, &c., are mentioned as places where it has been recently captured.

The ninth and last sub-family of the *Tortricidæ* is that of the *Cochylidi*, containing nine British genera, *Lobesia*, *Cerata*, *Chrosis*, *Dapsilia*, *Argyrolepia*, *Eupœcilia*, *Argyridia*, *Lozopera* and *Xanthosetia.*

The genus *Lobesia.* The insects assigned to this genus have the palpi longer than the head, the wings more than twice as long as broad, the front edge slightly arched, and the tip rather acute. The females are rather smaller than the males, and have the fringed margin of the hind-wings gradually indented below the tip. There is but one British species.

Lobesia reliquana (the Orange and Black T, No. 8). The Caterpillar of this brightly coloured little insect is unknown. The perfect Moth appears in May, and flies in the bright sunshine. The hind-wings of the female are much darker than those of the male, being of a dusky brownish gray. It is far from uncommon in the southern counties, but extremely rare in other parts of the country.

The genus *Cerata.* The insects assigned to this genus have the palpi spread, and pointing upwards. The fore-wings are of long proportion, but rather blunt at the apex. There are two British species.

Cerata Servillana (the Servillian T, No. 9). The Caterpillar of this insect is unknown, the perfect insect appearing in woods very early in the spring, where it may be sought as early as March. It conceals itself during the day among dry leaves, where it is easily secured.

The other species of this genus is *C. semplana*, one of the least of the group popularly defined as the T's.

The genus *Chrosis*. The general characters of this genus may be said to be as follows :—the palpi slender and longer than the head, the fore-wings rather more than twice as long as wide, and rather obtuse at the apex. The two British species, however, which belong to it vary materially.

Chrosis tesserana (the Tessellated T, No. 10). The Caterpillar of this gaily-marked insect is unknown. The Moth appears both in June and August, and is very variable in colour. It is found most plentifully in chalky districts, the chalk downs of Brighton, Dover, &c., being recorded as places where it has been recently taken. There is a variety described by Stephens under the title *Argyrolepia decimana*.

The other species is *C. Audouinana* ; it has the fore-wings brownish-black, with an obscurely defined patch of orange at the tips. It is found where oaks abound in June and July.

The genus *Dapsilia*. The insects assigned to this genus have the palpi longer than the head, and the anterior wings twice as long as broad, and rather blunt at the tip. There is only one British species.

Dapsilia rutilana (the Scarlet-barred Gold T, No. 11). The Caterpillar of this pretty, and brightly-coloured species is yellowish-green, with the head bright orange. It feeds on the Juniper, in the foliage of which it surrounds itself by a thickly-spun web. It is full fed in June. The Moth appears in July and August. It is not scarce in chalky districts, especially in the chalky downs of Surrey.

The genus *Argyrolepia*. The general characteristics of this genus may be said to be, long and slender palpi, the fore-wings narrow and elongate in general form, the front slightly arched, and the apex obtuse. But the species, though only seven in number, vary so considerably that they are divided into three sections, under separate distinctive titles, to denote their respective affinities with other genera. These three divisions are arranged in the following order :—Division A., *Commophila ;* B., *Chlidonia ;* C., *Lozopera*.

Argyrolepia badiana (the Burdock T, No. 12). The Caterpillar of this species feeds within the stems and roots of Burdock. The Moth appears in July. It is widely distributed and plentiful wherever the Burdock is found in abundance.

The other species, in this, the last division (*Logopera*), are, *A. Baumanniana*, *A. Cnicana*, and *A. Dubrisana*, of which last there are several varieties, formerly named as distinct species. In the first division (*Commophila*) the species are *A. Æncana*, and *A. Schrebersiana*. In the second division (*Chlidonia*) there is only one species, *A. Mussehliana ;* of these *A. Baumannia* is one of the handsomest.

The genus *Eupœcilia*. The insects in this genus have the palpi scarcely projecting beyond the head ; the fore-wings are long and rather narrow, the front edge being nearly straight. There are seventeen species which differ considerably in their characters, and which are therefore arranged in four divisions, "*Notocella*," "*Asthenia*," "*Eupœcilia*," and "*Cochylis*," in allusion to the genera to which these divisions bear respectively more or less affinity.

Eupœcilia dubitana (the Doubtful T, No. 13). This pretty Moth is on the wing in July and August, and has been recently taken at Bristol, Farnham, and one or two other places. It belongs to the first division of the genus.

The other species are as follows :—In the first division (*Notocella*), *E. atricapitana*. In the second division (*Asthenia*), *E. nana*. In the third division (*Eupœcilia*), *E. maculosana*, *E. sodaliana*, *E. Carduana*, *E. ambiguella*, *E. angustana*, *E. affinitona*, *E. Griseana*, and *E. notulana*. In the fourth and last division (*Cochylis*), there are *E. rupicola*, *E. flaviciliana*, *E. roscana*, *E. subroseana*, and *E. ruficiliana*. Many of these, from their bright yellow or rosy colours, are very attractive little insects.

The genus *Argyridia*. The insects assigned to this genus have the palpi longer than the head, the fore-wings extremely long and narrow, being in length more than three times their breadth. The front of the anterior wings is nearly straight, and the apex acute. There is but one British species.

Argyridia dipoltella (The Orange-barred Pearl T, No. 14). The Caterpillar of this delicately marked insect is unknown. It appears in the perfect form in July and August, but is very scarce. Several places in Surrey have, however, yielded recent specimens.

The genus *Lozopera*. The insects assigned to this genus have the palpi rather slender, and projecting

beyond the head; the fore-wings, like those of the last genus, are of exceedingly long proportion, sometimes exceeding in length three times their breadth. The front of the anterior wings is straight, and the apex sharp. There are five British species.

Lozopera alternana (the Littoral Straw T, No. 15). The Caterpillar of this pretty primrose-coloured Moth is unknown. The perfect insect appears in June and July. It is widely distributed, but rather local, and rarely very plentiful.

The other species are *L. Francillana*, *L. dilucidana*, *L. Smeathmanniana*, and *L. straminea*; most of these are of pale straw colour, and various shades of pale yellow, and sometimes very delicately marked.

The genus *Xanthosetia*. The insects assigned to this genus have the palpi extending considerably in front of the head, the fore-wings about twice as long as broad, the front edge slightly but regularly arched, and the tip acute. They are generally of a pale lemon colour, but the species are not very homogeneous in their characters, and although there are but three in the genus, they are separated into two divisions,—A., "*Euxanthis*," and B., "*Hysterosia*," suggesting other genera to which they exhibit more or less affinity.

Xanthosetia Zœgana (the Zœgian T, No. 16). The Caterpillar of this brightly-coloured and conspicuous insect feeds on the roots of *Scabiosa columbaria*. The Moth appears in May, and again in August. It is not so common as the other species' in the first division, but is widely dispersed, and far from rare.

The other species in the first division (*Euxanthis*), is *X. hamana*, which is rather larger than *X. Zœgana*, but paler in colour. In the third division (*Hysterosia*), the only species is *X. inopiana*, which, instead of having the anterior wings of a yellow tone like the typical species, is of a dull drab-colour, from which circumstance it derives its popular name, the Plain Drab T.

REPUTED BRITISH TORTRICES.

In the Sub-Family Tortricidi.

Lozotænia croceana . The large Saffron T., and a variety known as Tortrix ochreana.
Lozotænia subocellana The Eyelet T.
Lozotænia ochreana . The Ochreous Oblique-bar T.
Lozotænia gnomana . The Dial T.
Lozotænia trifasciana . The Triple Oblique-barred T.
Lozotænia biustulana The Scorched T.
Lozotænia obliquana . The Doubtful Oblique-bar T.
Oxigrapha Leacheana . The Leachean T.
Peronea divisana . . The White Pinioned T.
Paramesia Modeeriana The Modeerian T.
Paramesia peregrinana The Peregrine T.
Paramesia Steineriana . The Steinerian T.
Croesia trileucana . . The Triple Blotched T.

In the Sub-Family Spilonotidi.

Spilonota incarnatana The Rosy Short Cloak T.

In the Sub-Family Grapholithidi.

Pœcilochroma Schreberiana The Schreberian T.
Halonota similana . The Middle Double-blotched T.
Halonota rusticana . . . The Rustic Blotch-back T.
Retinia Resinella . . . The Resin T.
Carpocapsa amplana . . The Full T.
Dichrorampha inquinitana The Large Gold-fringed T.
Grapholita Hastana . . The Hastian T.
Grapholita aspidiscana . . The Bright Sealed T, and two varieties known as Tortrix Zachana, and Tortrix Monetulana.
Grapholita Vappana . . The Dubious T.

In the Sub-Family Sciaphilidi.

Cnephasia Wahlbomiana . The Wahlbomian T.
Cnephasia fuligana . . The Dark-barred Gray T.
Syndemis asinana . . . The Large Gray T.
Syndemis cinctana . . . The Chalk-hill T.

In the Sub-Family Sericoridi.

Orthotænia fasciolana . The Small Straight-barred T.
Sericoris flavofasciana . The Yellow-barred T.
Sericoris bipunctana . The Double-spotted T.
Sericoris Lediana . . The Ledian T.
Sericoris penthinana . The Cloaked Likeness T.

In the Sub-Family Cochylidi.

Chrosis decimana . . The Ten-spotted T.
Eupœcilia pustulana . The Dull-blotched T.
Argyroptera Lathoniana The Lathonian T.


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PLATE LIV.

No. 1.—The Wall Gray (*Eudorea murana*).

No. 2.—The Pine Knot-horn (*Nephopteryx Abietella*).

No. 3.—The Rosy Veneer (*Eurhodope carnella*).

No. 4.—The Birch Knot-horn (*Pempelia Betulæ*).

No. 5.—The Warted Knot-horn (*Acrobasis tumidana*).

No. 6.—The Thistle Ermine (*Myelophila cribrum*).

No. 7.—The Porphyry Knot-horn (*Myelois suavella*).

No. 8.—The Twin-barred Knot-horn (*Homœosoma sinuella*).

No. 9.—The Double-striped Red Knot-horn (*Cryptoblabes bistriga*).

No. 10.—The Hoary Knot-horn (*Gymnancyla canella*).

No. 11.—The Cinerous Knot-horn (*Ephestia elutella*).

No. 12.—The Cloaked Knot-horn (*Plodia interpunctella*).

No. 13.—The Dingy Veneer (*Hypochalcia ahenella*).

No. 14.—The Cast Knot-horn (*Araxes Lotella*).

No. 15.—The Honey Moth (*Achroia grisella*).

No. 16.—The Honey-comb Moth (*Galleria Mellonella*).

No. 17.—The Caterpillar of the Honey-comb Moth.

No. 18.—The Green-shaded Honey Moth (*Aphomia sociella*).

No. 19.—The Double Spot (*Melissoblaptes bipunctanus*).

Having in my last Plate completed the description of all the genera of the extensive family of *Tortricidæ*, I have now to commence the illustration of the *Crambidæ*. In the arrangement of the genera belonging to this family I have followed that finally adopted by the late Mr. Stephens, whose loss is still lamented by all British Entomologists as one which seems at present irreparable. In his arrangement of this group of our native *micro-lepidoptera*, Mr. Stephens endeavoured, and as it appears to me very successfully, to arrange these insects according to their natural affinities, at all events in so far as it is practicable with a collection confined to British species, in which many gaps must necessarily occur, and many links exhibiting generic affinities be missing. It is the system of arrangement adopted in the British Museum, for which purpose, in fact, Mr. Stephens' elaborate revision of the *Crambidæ* was undertaken.

In this system, the family of the *Crambidæ* is divided into *five* Sub-Families, and twenty-three genera; the Sub-Families being *Eudoridi*, *Phycidi*, *Galleridi*, *Crambidi* and *Chilidi*. One of the most distinctive characters of the family is the apparent size and width of the wings when flying, and their narrow and slender effect when the insect is at rest, and they are compactly folded close to the body. They are also distinguished by the length of the palpi. These characters, however, are not common to the whole family, though they so remarkably distinguish the typical genera. They abound in cool grassy places, and generally appear between May and September. By some authors the whole family is simply restricted to the two genera, *Crambus* and *Chilo*.

The Sub-Family *Eudoridi* contains but one genus, *Eudorea*.

The genus *Eudorea* is a very extensive one, containing thirteen species, which are distinguished by the length of the maxillary palpi which project beyond the labial palpi. The fore-wings are moderately broad, and are not folded in repose as with the typical *Crambidæ*. The Caterpillars are dull coloured, with horny spots, and feed on lichens protecting their progress by a continuous tunnel of closely woven web.

Eudorea murana (the Wall Gray, No. 1). The Caterpillar of this species is pale brown, the head and second segment being black. It is found among moss in June. The perfect Moth appears in June and July. It is a widely distributed species, being found in both southern and northern districts, but more commonly towards the north, especially in the West Riding of Yorkshire.

The other species are *E. Cembræ*, *E. Ambigualis*, *E. Pyralella*, *E. truncicolella*, *E. Cratægella*, *E. frequentella*, *E. Portlandica*, *E. resinea*, *E. lineola*, *E. angustea*, *E. alpina*, *and E. pallida*. All these species have a great family resemblance. They generally repose during the day on the under side of branches, or on the sheltered side of some stony ledge. *Ambigualis*, *pyratella* and *frequentella* are common; the others are more or less local. They are all rather obscure in colour. They are classed by some authors with the *Tiniæ*.

The second Sub-Family of *Crambidæ* is that of the *Phycidi*, which is much more extensive than the last, and contains thirteen genera: *Nephopteryx*, *Eurhodope*, *Pempelia*, *Acrobasis*, *Myelophila*, *Myelois*, *Homœosoma*, *Cryptoblabes*, *Gymnancyla*, *Ephestia*, *Plodia*, *Hypochalcia*, and *Araxes*. The chief characters of these genera are—

antennæ simple in the male, often having a tuft of scales near the base; labial palpi generally long and porrected; the anterior wings slightly folded in repose, but not so much as those of the typical *Crambidæ*. The Caterpillars feed either in the stems or on the foliage of plants. Those of a few of the species preferring dried animal substances. They generally spin a silken gallery to protect the course of their ravages.

The genus *Nephopteryx*. The general characters assigned to this genus are, antennæ of the males curved at the base, and having in the curve a tuft of long scales. The fore-wings are moderately narrow with distinct markings of a striped character; but the only two British species differ so much that they are placed in two distinct sections of the genus, *A. Dioryctria* and *B. Nephopteryx*. Both these species as well as many others of the *Crambidæ* are popularly known as "Horns" or Knot-horns, from the length and conspicuous character of the palpi, and the knot-like appendage of scales at the base of the antennæ.

Nephopteryx Abietella (the Pine Knot-horn, No. 2). The Caterpillar of this species, according to Zeller, is pale dull pinkish, grayer on the back, or sometimes greenish; the spots are reddish brown. It feeds in Fir cones and decayed wood in November and December. The Moth appears in June, and appears to be rather widely distributed though not common. It has been recently taken at Scarborough, York, and other places. This species belongs to the division *Dioryctria*.

The other species, *N. Roborella*, belongs to the second division (*Nephopteryx*). It is a later species than the other, not appearing before August. There are two very distinct varieties of this genus formerly named *N. legatea* and *N. cristea*.

The genus *Eurhodope*. The only British species assigned to this genus has the antennæ partially clothed at the base with long scales, and also strongly curved. The palpi are rather long, and point upwards. The fore-wings are oblong, and partially folded in repose. Some authors place species assigned to this genus in the genus *Pempelia*.

Eurhodope carnella (the Rosy Veneer, No. 3). The Caterpillar of this pretty species is unknown. The Moth appears in July, and seems to frequent the coasts; it is however rather rare. It has been taken recently at Dover, and at Ventnor. There is a variety formerly known as the *Phycis carnea* of Treitschke, and the number of synonyms by which the species has been known would fill a page of this work.

The genus *Pempelia*. In this genus the perfect insects have the labial palpi as long as the head. The maxillary palpi scarcely visible. The antennæ of the males are setaceous, and in some species having tufts of long scales near the base. The body is rather robust, and the fore-wings are folded when in repose. There are seven British species.

Pempelia Betulæ (the Birch Knot-horn, No. 4). The Caterpillar of this species, according to Zeller, is nearly black, with two pale yellow lines down the back, and a pale line of the same colour at the side. It feeds on Birch in May and the Moth appears in June and July. It is a rare species. It was formerly taken in Darenth Wood, and more recently near Manchester, and at Bristol.

The other species are, *P. ornatella*, *P. dilutella*, *P. hostilis*, *P. fusca*, *P. formosa* and *P. palumbella*. Among these *P. dilutella* found in chalky places, and the rosy tinged *P. formosa* are most likely to attract the attention of collectors; *fusca* and *palumbella* are found in high and heathy situations.

The genus *Acrobasis*. The insects assigned to this genus have the labial palpi rather short, and pointing upwards. The antennæ of the males have a large tuft of long scales at the inside of the base. The fore-wings are folded in repose. There are eight British species, distinguished principally by the different colour of the basal portion of the wings.

Acrobasis tumidana (the Warted Knot-horn, No. 5). The Caterpillar of this species, according to Treitschke, is dusky purple with many slender white stripes, and a broad lateral stripe of white marbled with pale brown. The head and second segment are brown spotted with black. It feeds on the foliage of the Oak in May and June. The Moth appears in July and August. It is rather rare, but has been taken recently at Bristol, Lewes, Lyndhurst, and other places. This species may be easily distinguished from the others of the genus by the orange tone of the basal portion of the anterior wings.

The other species are *A. consociella*, and *A. angustella*, the first having the anterior wings reddish gray, and the second of nearly the same tone as the rest of the wings; the wings being at the same time narrower than in the two other species.

The genus *Myelophila*. The single British species assigned to this genus has been separated from the genus *Myelois* principally on account of the peculiar character of the marking of the wings; the rest of the characters according very closely with those of the following genus, *Myelois*, to which the reader is referred. The following distinctive characters may, however, be cited. Palpi four in number, the labial ones long, slender and erect. The antennæ of the males furnished with tufts of scales at the base. The anterior wings elongate-triangular in form, and folded when in repose. The body long, slender and tufted at the extremity in the males. In some systems the insect assigned to this genus is retained in the genus *Myelois*, whilst Godart classed it with the distant *Lithosiæ*, with which at a glance it appears to have some affinity.

Myelophila cribrum (the Thistle Ermine, No. 6). The Caterpillar of this species, according to Treitschke, is grayish, striped with bluish green; the head and second segment being brown. It feeds inside the stems of Thistles in October and March, being probably double-brooded; or, the Caterpillars remain dormant in the depth of winter and revive to complete their growth early in the spring. The Moth appears in July and August.

The genus *Myelois*. The insects assigned to this genus have in some instances, the antennæ tufted with scales at the base, and in other instances simple. The labial palpi are of moderate length, and pointing upwards. The fore-wings are oblong, with the longitudinal stripy markings very distinct in some species. The two species, *suavella* and *sanguinella*, have been formerly classed with the *Lithosiæ* by some writers.

Myelois suavella (the Porphyry Knot-horn, No. 7). The Caterpillar of this pretty insect, according to Treitschke, is reddish-brown, with a brown head, and the second segment black. It feeds on the Sloe in May and beginning of June, the perfect Moth appearing at the end of June or in July. It was formerly taken at Epping, the New Forest, &c.; and has more recently been captured at Bristol, Lyndhurst, and other places.

The other species are *M. Marmorea*, *M. Advenella*, *M. Ceratoniella*, *M. pinguis*, and *M. Artemesiella*.

The genus *Homœosoma*. The insects assigned to this genus have the antennæ of the males straight at base, but much compressed. The labial palpi extend beyond the head and point rather upwards, the fore-wings are narrow. There are four British species.

Homœosoma sinuella (the Twin-barred Knot-horn, No. 8). The Caterpillar is unknown. The Moth appears in July. It was first taken in Epping Forest, and more recently at Brighton, &c., &c.

The genus *Cryptoblabes*. The single British species assigned to this genus has a peculiar character in the antennæ of the males, from which a small tooth-like projection arises near the base. The labial palpi are short, and the fore-wings narrow.

Cryptoblabes bistriga (the Double-striped Red Knot-horn, No. 9). The Caterpillar of this species is unknown. The Moth appears in June and July, and has been recently taken near Bristol, Lyndhurst, and Chesterfield.

The genus *Gymnancyla*. Like the last, this genus only contains a single British species. The characters of the genus are, antennæ in both sexes curved at the base; labial palpi thick and moderately long; maxillary palpi with a long tuft in the males; the fore-wings rather narrow, and the stripes indistinct.

Gymnancyla canella (the Hoary Knot-horn, No. 10). The Caterpillar of this species is undescribed, but is known to feed on *Salsola* (the common Saltwort); the Moth appears in June, and has been recently taken at Hastings, Folkestone, and other places.

The genus *Ephestia*. The insects assigned to this genus have the antennæ of the males curved at the base; the labial palpi short and pointing upwards. The males have a tuft of hair near the base of the fore-wings. There are two British species.

Ephestia elutella (the Cinereous Knot-horn, No. 11). The Caterpillar of this species is whitish-gray, with a pink line down the back, the head and second segment being pale brown. It feeds on dry Hazel nuts, Figs, &c., in January and February, but appears to prefer chocolate, as it is always plentiful in chocolate warehouses. The Moth appears in June and July. Bristol, Liverpool, and other places, are cited as localities in which it has been recently taken by collectors.

The other species is *E. semirufa*, which is of a much darker gray tone.

The genus *Plodia*. The single British species assigned to this genus is by some authors placed in *Ephestia*. The principal difference in general appearance between this species and those assigned to the last

genus, is the conspicuous white patch at the base of the fore-wings; the colour of the basal portion of the fore-wings being considered a characteristic feature in the present group. The single British species has the knotted antennæ of the related genera.

Plodia interpunctella (the Cloaked Knot-horn, No. 12). The Caterpillar of this species is of a creamy-white colour, with the head and second segments brown. It feeds on figs, dried insects, &c., in October and November. The Moth appears in June and July. It has been taken by collectors in London, Liverpool, and other places.

The genus *Hypochalcia*. The insects assigned to this genus have the antennæ rather thick, those of the male being compressed near the base. The labial palpi are long; the wings rather narrow, with faint markings. The females are smaller than the males. There is but one British species.

Hypochalcia ahenella (the Dingy Veneer, No. 13). The larva of this species is unknown. The perfect Moth appears in May and June. It is taken at Lewes, at Lyndhurst, and in Yorkshire.

The genus *Araxes*. The insects assigned to this genus have the antennæ of the males curved at the base. The labial palpi are rather long, the anterior wings are covered with loose scales, and have the markings very indistinct. There are two British species.

Araxes Lotella (the Coast Knot-horn, No. 14). The Caterpillar of this species, according to Zeller, is pale-yellow, with the head brown. It feeds on the roots of Grasses, (especially *Festuca ovina*, the great Oat-grass), in April and May. The Moth appears in July. It has been taken at Birkenhead, Stowmarket, Redcar, &c., &c.

The other species is *A. Farrella*, distinguishable by a clear white streak towards the costa.

The third sub-family of the *Crambidæ* is that of the *Galleridi*, containing four genera, which have received the distinctive name of the *Galleridi* from their habit of burrowing into substances which they make their food and protecting their progress by a gallery of silk which is spun as they proceed. The four genera are *Achroia*, *Galleria*, *Aphomia*, and *Melissoblaptes*. The Caterpillars of all four species feed on honeycomb, in which they form galleries and commit great ravages.

The genus *Achroia*. This genus contains but a single British species. The characteristics of the genus are antennæ simple, but with a tuft of scales at the base. The palpi short and drooping, the fore-wings rounded at the tip.

Achroia grisella (the Honey-moth, No. 15). The Caterpillar of this species has not been accurately described; but it is known to feed on honeycomb, and is occasionally very plentiful, though the Moth is not very often captured. It has, however, been recently taken in great numbers at Bristol, and specimens have been taken by collectors in the neighbourhood of Liverpool.

The genus *Galleria*. The only British species assigned to this genus has the antennæ simple, with a tuft of scales on the underside at the base. The fore-wings are large, and have the fringed edge strongly indented beneath the tip.

Galleria Mellonella (the Honeycomb Moth, No. 16). The Caterpillar of this species (No. 17), feeds in May and June on honeycomb, like those of the related genera, making galleries within it protected by a tough silken lining. The Moth appears in August, and is occasionally common, but young collectors have often long to wait before they procure specimens. It is often considerably larger than the specimen figured.

The genus *Aphomia*. The antennæ are simple; those of the males with a tuft of scales beneath. The palpi of the female are longer than those of the male; the wings are ample. There is but one British species, which is the largest of the group.

Aphomia sociella (the Green-shaded Honey Moth, No. 18). The Caterpillar of this species is pale buff, darker on the back, and slightly hairy; the head and second segment dark brown. It feeds on the honeycomb in beehives, destroying the comb, and also the young bees in the larva state, forming its galleries in every direction, which are so stiffly lined with silk as to protect it from the stings of the bees, which attempt, but in vain, to attack and expel their enemy. The Moth appears in July and August.

The genus *Melissoblaptes*. In this genus the antennæ are simple, the tuft at the basal joint being obsolete. The palpi of the male are short and drooping, those of the female being large and more porrected. The fore-wings have the fringed margin not indented.

Melissoblaptes bipunctanus (the Double spot, No. 19). The Caterpillar of this species remains undescribed. The perfect Moth appears in August, and was originally taken by Mr. Halchett, in the Jews' Burying Ground at Stepney, and since at Deal, &c.


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PLATE LV.

No. 1.—The Dwarf Veneer (*Platytes Cerussellus*).
No. 2.—The Necklace Veneer (*Eromene ocellea*).
No. 3.—The Pearl-streak Veneer (*Crambus Hamellus*).
No. 4.—The Gigantic Veneer (*Schœnobius gigantellus*).
No. 5.—The Wainscot Veneer (*Chilo Phragmitellus*).
No. 6.—The Autumnal Dagger (*Exapate gelatella*).
No. 7.—The Caterpillar of the Autumnal Dagger.
No. 8.—The Rosy-day (*Dasystoma Salicella*).
No. 9.—The March Dagger (*Chimabacche Fagella*).
No. 10.—The Caterpillar of the March Dagger.

THE fourth sub-family of the *Crambidæ* is that of the *Crambidi*, containing three genera, namely *Platytes*, *Eromenes*, and the typical genus *Crambus*. All the genera bear a strong family likeness to each other, and the whole group are popularly known as the *Veneers*, possibly from the streaking of the wings having some resemblance to the veining of rare inlaid woods.

The genus *Platytes*. The insects assigned to this genus have the antennæ simple in both sexes; and have the palpi projecting conspicuously beyond the head. They are generally of smaller size than the true *Crambidæ*, and their wings are rather shorter proportioned, but in repose they are folded so as to give to the insect the narrow, elongated appearance peculiar to the whole family. They have not, however, the colours longitudinally divided, but are generally distinguished by pale transverse marks across the fore-wings. There is but one British species, which is included by some English authors in the extensive genus *Crambus*.

Platytes Cerussellus (the Dwarf Veneer) is represented at No. 1. The female of the species is whiter, but with similar markings. The Caterpillar is unknown, but the moth appears in June and July. Kent and Devonshire were formerly notable as places where specimens had been taken, but it has been recently captured at Lewes, Manchester, Mickleham, &c.

The genus *Eromene*. The insects assigned to this genus, have the antennæ simple in both sexes and the antennæ extending conspicuously beyond the head. They are of the ordinary medium size of the typical *Crambidæ*, and the wings are narrowly folded when in repose; but like those belonging to the preceding genus, they are not marked longitudinally by different tones of colour, having instead transverse markings, generally near the edge of the anterior wings.

Eromene ocellea (the Necklace Veneer, No. 2). This pretty species is marked with a transverse row of bead-like spots near the fringed margin of the anterior wings, from which it derives its popular name. It was formerly placed by Mr. Stephens in his genus *Araxes*, and described from an unique specimen, from the collection of Mr. Haworth, taken near London.

The genus *Crambus*. This genus may be said to form the type round which are grouped, not only the genera belonging to the sub-family *Crambidi*, but also those in the whole family *Crambidæ*. The antennæ are simple in both sexes, the palpi long and conspicuous, and joined together like a beak. The front-wings are of rather narrow proportions, and rather blunt at the fringed edge, but sometimes suddenly curving out at the angle into an abrupt point. The front-wings are generally marked by a pale central longitudinal streak, but there are

many variations to this rule, and indeed there are so many other slightly aberrant characteristics in the species assigned to this extensive genus, that it is divided into eleven sections named in accordance with the features of the species assigned to the respective sections. The Caterpillars are but little known, but it is ascertained that they feed generally in moss, constructing silky galleries which help to conceal their progress.

Crambus Hamellus (the Pearl-streak Veneer, No. 3). This species, belonging to the section *Argyrotcena*, appears in July. The Caterpillar is unknown. The perfect insect frequents woods and forests in July and has been recently taken near Manchester, Weybridge, &c.

The other species are arranged as follow :—Section 1, *Thisanotia*, containing two species, *C. chrysonuchellus* and *C. rorellus*. The second section, *Argyrotcuchia*, containing but a single British species, *C. falsellus*. The third section, *Aneylolomia* has likewise only one British species assigned to it, *C. tentaculella*. The fourth section *Argyrotcena*, contains seven species, *C. pratellus*, *C. Dumetellus*, *C. Ericellus*, *C. Sylvellus*, *C. Hamellus*, (the one figured), *C. pascuellus* and *C. Uliginosellus*. The fifth section, *Chrysotcuchia*, contains but a single species, *C. Hortuellus*, (the Garden Veneer). The sixth section, *Exoria*, contains two species, *C. Culmellus*, *C. Pedriolellus*. The seventh section, *Pediasia*, contains three species, *C. inquinatellus*, *C. genieuleus* and *C. aridellus*. The eighth section, *Argriphila*, contains two species, *C. selasellus* and *C. tristellus* (the Common Veneer). The ninth section, *Eucarphia*, contains a single species, *C. furcatellus*. The tenth section, *Catoptria*, contains three species, *C. margaritellus*, *C. Pinetellus*, and *C. latistrius*. The eleventh section, *Selagia*, contains three species, *C. perlellus*, *C. Warringtonellus*, and *C. lithargyrellus*. Many of these species are subject to great variations of size and colour, and the most striking varieties of several of them were formerly considered distinct species and named as such.

The sub-family *Chilidi* contains two genera, *Schœnobius*, and *Chilo*, both of which have the general character of *Crambus*, except that the wings are generally larger and narrower, and more hooked at tip, from which they are popularly distinguished as the Hook-tip Veneers.

The genus *Schœnobius*. In this genus the antennæ of the males are slightly ciliated, the anterior wings are very elongate, and extending to a long point at the apex, which is more or less hooked. There are three British species.

Schœnobius gigantellus (the Gigantic Veneer, No. 4). This elegant and slenderly formed species, is found in marshy places in June and July, the female differs from the male in having the fore-wings unspotted, and the hind-wings entirely white. The Caterpillar is described by Treitschke as of a pale-yellow colour tinged with grayish, the head and second segment being of a bright orange-brown. It feeds in the stems of the reed *Arundo Phragmites;* this insect is very rare, it has been taken most frequently in the marshes about Whittlesea-mere.

The other species are *S. mucronellus* (the Dark Hook-tip Veneer), and *S. forficellus* (the Pale Hook-tip Veneer), which last is subject to great variation in the markings of the fore-wings, and the most striking of the varieties have been considered distinct species by Haworth, under the names of *Palparia hirta*, *P. fumea*, *P. caudex*, &c.

The genus *Chilo* is distinguished from *Schœnobius* principally by the larger size, and still more slender wings. The males have the antennæ slightly hairy, the females simple. There are two British species, *C. Phragmitellus* and *C. cicatricellus*.

Chilo Phragmitellus (the Wainscot Veneer, No. 4). This insect is the largest of all the *Crambidæ*. The wings of the female are less long and acuminated than those of the male. The Caterpillar is described by Treitschke, as being of a pale bone-colour with five brown stripes, the head and second segment being of a bright orange-brown. It feeds on reeds, especially the *Arundo Phragmites*, and is found both in October and March. The perfect Moth appears in June and July, and is found in the neighbourhood of Whittlesea-mere and other marshy districts.

The reputed British species of *Crambidæ* are the following :—*Nephopteryx Rhenella*, *Eurhodope argyrella*, *Pempella stigmatella*, *Acrobasis cristella*, *Myelois legatella*, *Homœosoma binœvella*, *Ephestia Ficella; Hypochalcea lignella*, *Melissoblaptes anellus; Prionapteryx nebulifera*, *Crambus intervibrellus*, *Cambrus lutcellus*, *Crambus combinellus*, *Crambus deliellus*, and *Crambus radiellus*.

The next sub-division of our *Micro-lepidoptera* is that of the *Tincina;* which contains several families and sub-families, comprising a vast variety of minute but elegantly formed Moths, many of which are distinguished by the richest colouring, heightened by metallic touches which give them a very brilliant appearance, and indeed under a magnifying glass some of them are very splendid objects.

The first family, *Exapatidæ*, contains three genera : *Exapate*, *Dasystoma*, and *Chimabacche*.

The genus *Exapate*. In this singular and restricted genus the palpi are short, and the antennæ of the males pubescent. The fore-wings of the male are long and narrow, being remarkably slender towards the base. The females have much shorter and smaller wings than the male, and in some cases the hind-wings are deficient altogether.

Exapate gelatella (the Autumnal Dagger, No. 6). The male of this pretty species has the fore-wings marked with sharply defined black touches similar to those of the well-known Dagger Moth, and from that peculiarity has been popularly termed the Autumnal Dagger. The female has only rudimental wings. The perfect Moth appears in November and December, and has been recently taken abundantly near Bristol, also not uncommonly near Manchester, York, and other places.

The genus *Dasystoma*. The insects assigned to this genus have the antennæ of the males densely ciliated. The wings of the males are long and narrow, rather arched in front, and having several distended veins ; but in the females they are very short and the hind pair entirely wanting. There is but one British species.

Dasystoma Salicella (the Rosy-day, No. 8). This insect is taken in woods in autumn, and again in April, but is not common. Bristol, Cambridge, and other places have yielded specimens lately. The female is much smaller than the male, the fore-wings being little more than rudimental, and the hind-wings entirely absent.

The genus *Chimabacche*. In this genus the palpi of the males are densely pilose, and the wings are very long, lying over each other horizontally when in repose. Those of the female are shorter and more acute at the tips, the hind pair being perfect though much shorter than in the male. There is but one British species.

Chimabacche Fagella (the March Dagger). This brightly marked species is found in March and April. The Caterpillar (No. 10) feeds on the foliage of various trees, drawing the leaves together by means of a silken web ; it appears in October. The Moth appears in vast numbers in certain localities, especially near Brighton, Plymouth, at Darenth Wood, and in many other places. It is generally found settled on the trunks of the trees on which the Caterpillar has fed.


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PLATE LVI.

No. 1.—The Pale Downy-horned (*Talæporia pubicornis*).

No. 2.—The Inconspicuous Solenebia (*Solenebia inconspicuella*).

No. 3.—The Dotted Border (*Diplodoma marginepunctella*).

No. 4.—The White-spotted Black (*Xysmatodoma melanella*).

No. 5.—The Spotted Bull (*Ochsenheimeria Vacculella*).

No. 6.—The Agaric Bull (*Euplocamus Boleti*).

No. 7.—The Black-cloaked Woollen (*Tinea tapetzella*).

No. 8.—The Four-dotted Brown (*Lampronia Luzella*).

No. 9.—The Verhuellian (*Lamprosetia Verhuellella*).

No. 10.—The Oehlmann's (*Incurvaria Oehlmanniella*).

No. 11.—The Purple Upper-wing (*Micropteryx purpurella*).

No. 12.—The Swammerdamian (*Nemophera Swammerdammella*).

No. 13.—The De Geerian (*Adela Degeerella*).

No. 14.—The Caterpillar of the De Geerian.

No. 15.—The Cocoon of the De Geerian.

No. 16.—The Chrysalis of the De Geerian.

No. 17.—The Copper Japan (*Nemotois fasciellus*).

THE second family of the sub-division *Tineina* is that of the *Tineidæ*. For the arrangement and reclassification of this, and the whole of the groups comprised in the sub-division *Tineina*, entomological science is deeply indebted to Mr. Stainton, whose system is followed in the arrangement of the collection in the British Museum, and which will therefore necessarily be followed in the present work. This family, though comprising within its limits the most minute of our British lepidoptera, may be said at the same time to contain some of the most splendid, especially those conspicuous insects belonging to the genera *Adela* and *Nemotis*, the long antennæ of which, six times longer in proportion to the size of the insect than those of any of the larger Moths or Butterflies, would render them very remarkable independently of the fine metallic colouring of their wings. Some of the microscopic species are even more beautiful than these, the front-wings being, in some instances, of the richest tones, approaching to scarlet, which are rendered still more beautiful by embossed dots of metallic brilliancy, and varying in tone from silvery-white to the richest gold. The hind-wings have deep silky fringes of unusual length, and, when magnified, some of the smallest species make a very magnificent appearance. Several of these resplendent but minute species are extremely rare, others very abundant. It is not, however, the whole family that can be spoken of as remarkable for beauty, the common House Moth being among the number.

The genus *Talæporia*. The antennæ of the males are ciliated, there are no maxillary palpi, and the tongue is wanting. The larvæ are case-bearing, and the case of this species is long and slender. The female is wingless. There are two British species.

Talæporia pubicornis (the Pale Downy-horned, No. 1). This species appears in June. The Caterpillar is unknown. It was formerly taken in woods near London, and in the New Forest. Mr. Stainton cites Grassington, Yorkshire, as a locality in which it has been recently taken, but it is very scarce.

The other species, *T. Pseudo-Bombycella*, is much smaller and much less rare, having been taken recently at Manchester and other places in abundance.

The genus *Solenobia*. The insects comprised in this genus closely resemble those assigned to the preceding; but they have the labial palpi much shorter, and the cases of the Caterpillars are also shorter. The wingless females of this class of minute Moths, when kept solitary, lay fertile eggs, but such eggs produce only females. There are two British species, *S. inconspicuella*, and *S. Douglasii*.

Solenobia inconspicuella (the Inconspicuous Solenobia, No. 2). This species appears in April. The

Caterpillar is described as gray, with the head blackish, the second segment being also black, and the third and fourth having each two black dots. The case is grayish-green, and is three-sided. It is found on palings and trunks of trees in March. Bristol, Manchester, Plymouth, &c., are cited as localities in which this Moth has been recently taken.

The other species, *S. Douglasii*, is thought by some to be only a variety of the preceding, but Mr. Eddlestone, as cited by Mr. Stainton, believes that there is even a third distinct species occurring near Manchester, which appears in May. The Caterpillars of this supposed distinct species are found under stones on the Moors.

The genus *Diplodoma*. The insects assigned to this genus have the antennæ ciliated in the males, and slightly toothed in the females. There are no maxillary palpi. The females have perfectly developed wings, but are generally less than the males. The Caterpillars are case-bearing, as in the two preceding genera, but the case is distinguished by being clothed in an outer covering. There is but one British species.

Diplodoma marginepunctella (the Dotted Border, No. 3). This pretty species is marked with pale yellow dots, which in some lights have a golden gloss difficult to represent in a drawing. The Caterpillar is described as dull-whitish, with the head and second segment brown. It is said to feed on Fungi in September and October. The perfect insect appears in June and July. It was formerly taken at Ripley, and considered extremely rare, but many places are cited for its recent capture, as Manchester, Plymouth, York, and many other localities.

The genus *Xysmatodoma*. The insects assigned to this genus have the head very hairy, the antennæ of the male strongly ciliated, no maxillary palpi, and the labial palpi short. The female has narrower wings than the male. The Caterpillar forms a case, but it is without an additional external covering, and is rather short. There is but one British species.

Xysmatodoma melanella (the White-spotted Black, No. 4). The Caterpillar of this species is described as dull-yellowish, and the head and the second segment black; the third and fourth segments being respectively marked with four black dots. It feeds on Lichen, and is found on the trunks of trees and on palings, in April and May. The perfect insect appears in June, and has been recently taken in several places in considerable abundance, especially in the neighbourhood of Manchester. It is generally found where Elm trees abound.

The genus *Ochsenheimeria*. The insects assigned to this genus have the antennæ rather thick, and sometimes clothed with scales to the middle. The fore-wings are oblong, and have a rough appearance from the semi-erect growth of the scales. The Caterpillars are without cases, and burrow in the stems and roots of Grasses. There are three British species.

Ochsenheimeria vacculella (the Spotted Bull, No. 5). The hind-wings of this species are devoid of scales, semi-transparent towards the base. The Caterpillar is unknown. The perfect insect appears in July, and has been recently taken at Darenth, Manchester, &c. It frequents houses, while *O. Bisontella* is generally found on heaths.

The second species is *Ochsenheimeria Bisontella* (the Little Bull). This species has received its popular name, the Little *Bull*, from the broad tuft of hair at the front of the head, which at once suggests the idea of a bull's head, or rather, perhaps, accompanied as it is by the hairy palpi and the scaly horns of the antennæ, it represents more nearly the miniature head of a Bison, from which no doubt originated the specific name *Bisontella*. *O. Birdella*, the third species, is found in pastures.

The genus *Euplocamus*. The insects assigned to this genus are larger than those of either of the immediately preceding genera. The head is hairy, as in the last, and the males have the antennæ partially clothed with tufts of fine hairs, which makes them appear pectinated. The maxillary palpi are folded, and the labial palpi have the terminal joint erect. The wings are much deflexed in repose. The Caterpillars feed upon Boleti. There is only one British species.

Euplocamus Boleti (the Agaric, No. 6). This is a very prettily marked species. The Caterpillar feeds on Fungi. The perfect insect appears in July, but is very scarce. It was formerly found in Birch Wood, Wanstead Flats, &c. The females generally rest upon the trunks of Aspens, and, if watched, the males may be found fluttering round them at dusk. This species has been recently taken in the New Forest, and in Epping Forest.

The genus *Tinea*. The insects assigned to this extensive genus, which may be called the typical one of the family, present many variations of general character, but the leading features of the genus are the following: The head is hairy; the antennæ moderately long and thick, but varying much in different species, those of the males being in most cases slightly ciliated. The maxillary palpi are generally folded, the labial palpi hairy, or bristly. The fore-wings are oblong; the hind-wings are often clothed with scales. The Caterpillars are frequently burrowers, feeding in cloth, bark, or other substances, in which they form galleries of the substance destroyed, joined together by silken web. There are thirty-one or thirty-two British species. It is of course impossible to illustrate this genus thoroughly by a single species, and yet the extent of the present work will not allow of more, or it would be impossible to restrict it within the limits originally proposed.

Tinea Tapetzella (the Black-cloaked Woollen, No. 7). The Caterpillar of this species feeds on woollen cloth under a gallery formed of the portions of the cloth destroyed. It is very common in houses throughout the summer.

The other species are *T. imella; T. ferruginella; T. rusticella; T. monachella; T. fulvimitrella; T. arcella; T. picarella; T. arcuatella; T. corticella*; *T. parasitella; T. Granella; T. cloacella; T. rurieolella; T. Coehylidella; T. albipunctella; T. Caprimulgella; T. misella; T. fuscipunctella; T. pellionella; T. pallescentella; T. flavescentella; T. lapella; T. biselliella; T. simpliciella; T. nigripunctella; T. semifulvella; T. bistrigella; T. subammanella; T. argentimaculella;* and *T. ochraceella;* amongst which *cloacella, corticella, Granella* and *argentimaculella* are the most prettily marked, the last having bright metallic bands running across the wings, of a silvery tone, and several silvery spots.

The genus *Lampronia*. The insects assigned to this genus fly by day; they have the antennæ rather thick, but without pectination. The maxillary palpi are folded; the labial palpi hairy, or bristly. The Caterpillars are either case-bearing, or boring in the stems of plants. There are four British species.

Lampronia Luzella (the Four-dotted Brown, No. 8). The Caterpillar of this pretty species is unknown, but the perfect insect appears in June, and is taken near London and in the New Forest, also at Teignmouth, and more plentifully at Chesterfield.

The other species are *L. quadripunctella, L. prælatella, and L. Rubiella*. The Caterpillars of *L. quadripunctella* feed in the young shoots of the Rose, those of *L. prælatella* in a case on the underside of Wild Strawberry leaves; those of *L. Rubiella* in the young shoots of Raspberry canes.

The genus *Lamprosetia*. The insects assigned to this genus have the head smooth on the top, but furnished thickly with hairs above the eyes. The maxillary palpi are short, and the labial palpi slender. The Caterpillars burrow under the fructifications of Ferns, &c., &c.

Lamprosetia Verhuellella (the Verhuellian, No. 9). The Caterpillar of this Moth is described as being of a pale buff, with the head and second segment black. It burrows under the fructification of *Asplenium, Ruta muraria, Scolopendrium vulgare*, and other plants of the Fern family. The moth appears in June, and has recently been taken at Bideford in Devon, and Richmond and Whitby in Yorkshire.

The genus *Incurvaria*. The insects assigned to this genus have a strong family resemblance to those of the last, but in some of the species the males have the antennæ pectinated; the hind-wings are generally more or less clothed with hair-scales. The Caterpillars either feed on leaves, eating away channels in them protected by a flat case, or burrow in the young stems without a case. There are five British species.

Incurvaria Oehlmanniella (Oehlmann's Incurvaria, No. 10). The Caterpillar of this species is found in a flat case under fallen leaves in October, and in February. The Moth appears in June, and has been recently taken in abundance at Bristol, and other places.

The other species are *I. muscalella, I. pectinea, I. tenuicornis*, and *T. capitella*. The Caterpillars of *muscalella* are found in their cases among fallen leaves, those of *capitella* feed in the young shoots of Currant bushes.

The genus *Micropteryx*. The insects assigned to this genus have the antennæ rather short for this group, and a space above each eye free from the hairiness which is a general characteristic. The wings are rather transparent, and the hind-wings are furnished with hair-like scales near the base. There are twelve British species. The Caterpillars are almost entirely unknown.

Micropteryx purpurella (the Purple Upper Wing, No. 11). The Caterpillar of this pretty species is unknown. The perfect insect appears in April, and has been recently taken in plenty at Plymouth, Teignmouth, York, and other places.

The other species are *M. Calthella; M. Aruncella; M. Seppella; M. Mansuetella; M. Allionella; M. Tunbergella; M. Salopiella; M. semipurpurella; M. unimaculella; M. Sparmannella.* Among these many are very richly coloured, with golden green and purple hues of a metallic lustre, especially *M. Allionella*, with purple wings varied by pale golden bars and spots; *unimaculella* has the front wings pale golden suffused with purple.

The genus *Nemophora.* One of the principal characteristics of the insects of this genus is the length of the antennæ, which is more than double that of the wings. The maxillary palpi are folded; the labial palpi short and hairy. The hind-wings have hair-like scales at the base. The Caterpillars have a case of depressed, or rather flattened form.

Nemophora Swammerdammella (the Swammerdamian, No. 12). The wings of this species have a fine semi-metallic gloss. The Caterpillar is whitish and semitransparent, with the head and second segment black, and narrow purplish-brown plates on the third and fourth segments. It forms a case of particles of dried leaves, and feeds on various plants. It is common and has been recently taken in abundance at Tenterden in Kent, Plymouth, Bristol, and many other places.

The genus *Adela.* To this genus, like the last, insects are assigned which are at once distinguished by the extraordinary length of the antennæ, those of the males being considerably longer than those of the females. The colour of most of the species is very brilliant. The Caterpillar forms a flat case.

Adela De Geerella (the De Geerean, No. 13). The Caterpillar of this handsome and remarkable species is yellowish-white, with a black head, and is said to feed in October and March on the Wood Anemone. The Chrysalis shows the long antennæ coiled in a roll at the extremity of the abdomen. The perfect insect appears in June, and is common and widely dispersed. It has been recently taken in great plenty at Lewes, Plymouth, &c., &c., The Caterpillar, the Chrysalis, and the Cocoon are represented at Nos. 14, 15, and 16.

The other species are, *A. Fibulella; A. rufimitrella; A. Sulzella; A. viridella; A. euprella;* among which *A. viridella*, with its extremely long antennæ and front-wings of resplendent golden green, with a brilliant metallic gloss, is perhaps the handsomest.

The genus *Nemotois.* The insects assigned to this genus have the antennæ of great length in the males, but not so long in the females, though sometimes, in that sex, thickened at the base. The eyes in the males are large and close together; but in the females, smaller and widely separated. There are four British species.

Nemotois fasciellus (the Copper Japan, No. 17). The Caterpillar of this handsome insect is unknown; the brilliant coppery gloss of the wings, which become greenish-golden at the base, gives them a very brilliant and attractive appearance. The head of the male is black, that of the female ferruginous. The Moth appears in June and July, and has been recently taken in Darenth Wood, Kent.

The other species are *N. Scabiosellus*, *N. cupriacellus*, and *N. minimellus*, all of which are remarkable for the fine golden or bronze-like gloss of the wings, varying from reddish purple to every shade of orange and green, but with few markings.


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PLATE LVII.

No. 1.—The Peacock's Feather (*Swammerdamia apicella*).
No. 2.—The White-horn Bar (*Scythropia Cratægella*).
No. 3.—The Allied Ermine (*Hyponomeuta Evonymellus*).
No. 4.—The Funereal Ermine (*Anesychia Funerella*).
No. 5.—The Sooty Ermine (*Chalybe Pyrausta*).
No. 6.—The Cartesian (*Prays Curtisellus*).
No. 7.—The Messingiellian (*Eidophasia Messingielli*).
No. 8.—The Annulated (*Plutella annulatella*).
No. 9.—The Chequered Hook-tip (*Cerostoma asperella*).
No. 10.—The Narrow-winged Veneer (*Theristis caudella*).

THE fourth family of the sub-division *Tineina* is that of the *Hyponomeutidæ*. It comprises six generas, which, collectively, contain nineteen species. Some of these are among our most common and abundant species, and in their larva state the most destructive to the foliage of our fruit trees. Others are, on the contrary, of extreme rarity, and among the most beautiful of our *Micro-lepidoptera*.

The genus *Swammerdamia*. The insects assigned to this genus have the head thickly clothed with erect hairs, and the hind-wings have a transparent patch at the base. The Caterpillars feed in a web on the surface of leaves, and the Chrysalis is formed in a closely woven cocoon. There are five British species.

Swammerdamia apicella (the Peacock's Feather, No. 1). The Caterpillar of this species feeds on the Plum; the perfect insect appears in April and May. It is very abundant.

The other species are *S. cæsiella*, *S. griseocapitella*, *S. lutarea*, and *S. Pyrella*.

The genus *Scythropia*. The insects assigned to this genus have the head rough, the palpi drooping, and the hind-wings with no transparent patch. The Caterpillars are gregarious, while those of the last genus are solitary. There is only one British species.

Scythropia Cratægella (the White-horn Bar, No. 2). The Caterpillar of this species is dull reddish brown, and feeds in groups in a common web, upon Hawthorn, in June. The perfect insect appears in July, and has been recently taken in sufficient plenty at Bristol, Cambridge, Plymouth, Lewisham, &c.

The genus *Hyponomeuta*. The insects assigned to this genus have the head smooth, the palpi short and reflexed, and the hind-wings with a distinct transparent patch. The Caterpillars feed in groups, and form a cocoon for the Chrysalis. The genus comprises the common though pretty Moths known as the Ermines, from their whitish gray wings spotted with black. There are six species.

Hyponomeuta Evonymellus (the Allied Ermine, No. 3). This species may be known by the distinctness of its three rows of black specks. The Caterpillar is of a dusky yellow with black spots, and feeds on Spindle in May and June. The perfect insect appears in July and August, and is very abundant.

The other species are *H. Viginti-punctatus*, *H. plumbellus*, *H. irrorellus*, *H. padellus*, and *H. Padi*. Of these *H. irrorellus*, distinguished by the irregularity of the spots and by a large dusky patch near the apex, is the most rare. *H. plumbella* has the hind-wings brown, and appears chiefly in the southern counties, but is nowhere very common.

The genus *Anesychia*. The insects assigned to this genus have the palpi moderately long and reflexed, and the hind-wings are without a transparent patch at the base. The Caterpillars are slightly pubescent and longitudinally streaked with different colours; they are solitary, and feed surrounded with web on the foliage of several plants belonging to the order *Boraginaceæ*. There are four British species.

Anesychia Funerella (the Funereal Ermine, No. 4). This species once thought extremely rare is now known to occur abundantly in some localities. The Caterpillar is lemon colour spotted with orange on the back, and having a pale black or purplish dorsal line. It is found in August, and the perfect Moth appears in the following June. It was originally only taken by Captain Blomer, at Clifton near Bristol, but it has since been taken at Richmond in Yorkshire, and several other places, and plentifully at Cambridge.

The other species are *A. pusiella*, *A. bipunctella*, and *A. decemguttella*. Of these the last is the most rare. It is beaten from Fir trees in Birch and Combe Woods, and also at Darenth, but it remains very rare. It may at once be distinguished by the eleven rather large and elongated black spots of the fore-wings, which at once distinguish it from its congeners, and from the common Ermines of the preceding genus.

The genus *Chalybe*. In this genus the palpi are conspicuously shorter than in the preceding. There is only one British species, and of that but one or two specimens have been taken.

Chalybe pyrausta (the Sooty Ermine, No. 5). I have not been able to obtain a specimen of this rare species. There is not one in the collection of the British Museum; nor is there a figure that I have been able to find in the illustrations of continental species in the works of Duponchel or Hübner. It is described by Mr. Stainton as having the front-wings of a dull sooty black, with three deep black spots placed nearly in a line longitudinally. The fringe sooty. The posterior wings and fringe dark smoky gray. A single specimen was taken in Sutherlandshire, in May, 1853, by Mr. Buxtone.

The genus *Prays*. The insects assigned to this genus are smaller than those of the preceding. They have the antennæ slender, filiform, and alike in both sexes. The head is smooth. The labial palpi are short, and hardly attenuated towards the tip. The hind-wings have no transparent patch divested of scales at the base of the hind-wings. The Caterpillars are solitary. There is only one British species.

Prays Curtisellus (the Curtesian, No. 6). The Caterpillar of this pretty species is dull pale green, marbled with pale ruddy brown, the markings being darkest along the back. It feeds on the young shoots of the Ash, in May. The perfect insect appears in June and July, and is very abundant in many parts of the country, both in the north and south, from Plymouth to York.

The Fifth Family of the Sub-division *Tincina* is that of the *Plutelidæ*. There are four genera in this family, comprising collectively eighteen species. Among these are the singular and handsome little Moth, well known as the "Honeysuckle," the pretty chequered Hook-tip, of extreme rarity, and the narrow-winged Veneer. Many of the other species are common, and some of them real pests to field and garden culture, especially the Gray Streak, *Plutella porrectella* and *P. cruciferarum*, so destructive to Turnip fields.

The Caterpillars of most of the species appear in May and June, and the perfect insects in most cases hybernate in the perfect state, and may be driven from thatch, or found sheltering in crevices of old palings very early in the spring. The four genera are *Eidophasia*, *Plutella*, *Cerostoma*, and *Theristis*.

The genus *Eidophasia*. The insects assigned to this genus have the antennæ thickened at the base, which is covered with scales. The maxillary palpi are rudimental, and the labial palpi slender; the second joint is produced beneath in a slender tuft, the terminal joint pointed. The Caterpillar and its habits are unknown. There is but one British species.

Eidophasia Messingiella (the Messingiellian, No. 7). This species, the illustration of which has been drawn from a specimen in the British Museum, is a recent addition to the list of British micro-lepidoptera, though now found to be plentiful in several localities, as Bristol, Lewes, Plymouth, &c.

The genus *Plutella*. The insects assigned to this genus have the maxillary palpi short, and the second joint of the labial palpi produced beneath a slender tuft, the terminal joint being erect. The fore-wings are of long and narrow proportions, and not indented below the tip. The Caterpillars generally feed on Cruciferous plants, which comprise a large proportion of our culinary vegetables; and this renders their presence very undesirable to the gardener, notwithstanding the attractiveness of some of the finer species to the collector. Some of the species form very elegant open-work cocoons, through which the form of the chrysalis may be very clearly discerned. There are four British species.

Plutella annulatella (the Annulated, No. 8). This pretty species has recently been taken in great abundance at Scarborough, at Belfast in Ireland, and other places, but the Caterpillar is as yet unknown.

The other species are *P. cruciferarum*, the Turnip pest, *P. porrectella*, and *P. Dalella*, which are all very prettily marked.

The genus *Cerostoma*. The insects assigned to this genus, as characterised by Mr. Stainton, have the maxillary palpi distinct, and the second joint of the labial palpi prolonged beneath into a tuft; the terminal joint being erect and pointed. The fore wings are rather long, and sometimes hooked, and the hind wings have rather long fringes. The Chrysalis is formed in a close cocoon, very distinct in character from the open one of the last genus. There are twelve British species.

Cerostoma asperella (the Chequered Hook-tip, No. 9). This is the rarest as well as the handsomest of the genus. The Caterpillar feeds on the foliage of the Apple in June, and the perfect insect appears in July, and for some time afterwards. It was formerly taken at Glanville's Wootton, near Sherborne, but it appears to be sought for in vain by recent collectors.

Cerostoma Xylostella (the Honeysuckle, No. 11). The Caterpillar of this remarkable and very handsome species feeds on the Honeysuckle, in May. It is a pale yellowish green, with a broad dull red stripe along the back. The perfect Moth appears in July and August, and is very abundant in gardens in all parts of the country.

The other species are—*C. sequella*, *C. vittella*, *C. radiatella*, *C. costella*, *C. sylvella*, *C. alpella*, *C. lucella*, *C. horridella*, *C. scabrella*, and *C. nemorella*, several of which are rather rare and very pretty insects.

The genus *Theristis*. The insects assigned to this genus differ by the larger tuft of the palpi, and by the more pointed fore-wings, and the much deeper fringes of the hind-wings. There is but one British species.

Theristis caudella (the Narrow-winged Veneer, No. 10). The Caterpillar of this conspicuous species is greenish gray, marbled with a brownish tone, and having a white line down the back, and the third and fourth segments being distinguished by conspicuous black spots. It feeds on the Spindle in May, and the perfect insect appears in August and September, after which it appears to hybernate, appearing again in April. It has been recently taken at Cambridge, Lewes, Bristol, Dartford Heath, and other places.


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PLATE LVIII.

No. 1.—The Dark-veined Long-wing (*Orthotælia Sparganella*).
No. 2.—The Steinkellnerian (*Semioscopis Steinkellneriana*).
No. 3.—The Thunbergian (*Enicostoma lobella*).
* No. 4.—The Long-horned (*Phibalocera Quercana*).
No. 5.—The Rare Exæretia (*Exæretia Allisella*).
No. 6.—The Alstrœmerian (*Depressaria Alstrœmeriana*).
No. 7.—The Powdered Gray (*Psoricoptera gibbosella*).
No. 8.—The Sub-cinereous (*Gelechia terrella*).
No. 9.—The Dingy Straw (*Parasia Lappella*).
No. 10.—The Rare Cleodora (*Cleodora Cytisella*).
No. 11.—The Lobster-clawed (*Chelaria Hubnerella*).
No. 12.—The Robertsonian Anarsia (*Anarsia Spartiella*).

THE fifth family of the sub-divison *Tineina* is that of the *Gelechidæ*. This is a very extensive family, and will in all probability be subdivided by future entomologists so soon as more is known of the structure and habits of the insects comprised within its limits, both in the perfect and preparatory stages. At present it contains insects of very various characters. Some of the species are of very sluggish habit, while others exhibit extreme activity both in the larva and perfect state. The larva of *Depressaria applana*, for instance, is very remarkable for the celerity of its motions; while others, such as *Phibalocera Quercana*, are very inert. The varieties of form are also considerable, both narrow and broad-winged species being comprised in the group. A few, as *Harpella Geoffrella*, are very splendid in their colouring, while others, as most of the *Gelechias* for instance, are extremely dull both in colour and markings. Most of the insects of this family appear in their perfect state between May and September, but as many of them hybernate in the perfect state, they are often found as early in the year as January or February, in mild weather, especially the common *Depressaria applana*.

The genus *Orthotœlia*. The insects assigned to this genus have the antennæ simple and of moderate length. The labial palpi are short, reflexed, and pointed. The abdomen is long and not flattened. The fore wings have short fringes. The Caterpillars have sixteen legs, and have the last segment flattened. There is but one British species.

Orthotœlia Sparganella (the Dark-veined Long-wing, No. 1). This species has sometimes a purple tinge on the fore wings. The Caterpillar is described as dull gray, with a brown head. It feeds on the leaves and stems of the Sparganium, in May and June. The perfect insect appears in July and August, and has been recently noticed as very abundant in some localities, as the neighbourhood of Birkenhead, Scarborough, &c.

The genus *Semioscopis*. The insects assigned to this genus have the antennæ of the males pubescent. The palpi are elongate, pointed, and recurved. The anterior wings are rather long and lanceolate, and of dull colours, with darker markings. The females are winged, but are smaller than the males. There are two British species.

Semioscopis Steinkellneriana (the Steinkellnerian, No. 2). This species generally appears in autumn, and is taken abundantly on hedges and in woods about the end of March.

The other species, *S. avellanella*, is much paler, the fore wings being whitish buff varied with darker, and having a black longitudinal streak. It is rather rare.

* NOTE.—Another insect has been inadvertently figured at No. 4, instead of *Phibalocera Quercana*,—see page 174.

The genus *Enicòstoma.* The insects assigned to this genus are principally distinguished from allied genera by the anatomical structure of the palpi, the labial palpi being arched, the second joint scaly, and the point smooth and ascending. There is but one British species.

Enicostoma lobella (the Thunbergian, No. 3). The Caterpillar of this species is pale green, with a paler line on each side of the back. It feeds on the under side of Sloe leaves in August and September. The perfect insect appears in the following June. It has been recently observed in some abundance at Cambridge, Lewisham, and other places.

The genus *Phibalocera.* The insects assigned to this genus have the antennæ longer than the wings. The labial palpi have the second joint scaly, and the terminal one slender and pointed. The Caterpillars form a flat web on the under side of leaves. There is but one British species.

Phibalocera Quercana (the Long-horned). Another insect having been figured at No. 4, instead of *P. Quercana*, it will be necessary to describe the present species in detail. The antennæ are nearly a fourth longer than those of the other species of this genus. The fore wings are rather arched in front and somewhat square at the fringed edge, and slightly concave ; the hind wings are rather convex at the fringed edge, and the fringes not very deep. The front wings are pale rosy gray with obscure darker markings, getting darker near the front edge, which has a whitish streak at the base, an elongated white spot near the middle, and a white streak at the tip. The hind wings are pale dusky cream colour with grayish fringe. The Caterpillar of this species is described as pale green, with a dark dorsal line edged with white. In May and June it feeds in a web on the under side of the leaves of the Oak, the Apple, and other trees. The perfect insect appears in July and August, and is very common. It has been recently noticed in great abundance at Bristol, Birkenhead, Plymouth, Tenterden, &c.

The genus *Exœretia.* The insects assigned to this genus have the antennæ of the males pubescent. The labial palpi are peculiar, having the second joint furnished beneath with a small tuft in the form of a brush. The front wings are slightly sinuate in front, and the fringe short.

Exœretia Allisella (the Rare Exæretia, No. 5). The Caterpillar of this species is at present undescribed. The perfect insect appears in July. It is considered rare, but has been taken at Birkenhead, Manchester, and other places, especially in some localities on the coast of Norfolk. My drawing is made from a specimen in the British Museum.

The genus *Depressaria.* This is a very extensive genus, containing no less than thirty-eight species, several of which differ rather materially from the generic type. The general characteristics are the following :— Antennæ simple, or only slightly pubescent in the males ; the labial palpi have the second joint furnished with a brush-like tuft of hairs. The abdomen is flat, with projecting scales at the sides. The fore wings are moderately long and slightly rounded at the tips. The hind wings are sometimes indented at the fringed margin near the angle next the body. The Caterpillars have sixteen legs.

Depressaria Alstrœmeriana (the Alstrœmerian, No. 6). The Caterpillar of this species is described as green, with three darker lines along the back. It feeds in July in folded leaves of Hemlock. The perfect insect appears in August, and has been recently observed in great abundance at Scarborough, Newcastle-on-Tyne, and many other localities. It is found most abundantly in Osier grounds.

The other species are so numerous that in the restricted limits of this work it will be impracticable to do more than give a list of their names, which are as follows :—*D. costosa ; D. liturella ; D. pallorella ; D. bipunctosa ; D. Umbellana ; D. assimilella ; D. nanatella ; D. atomella : D. arenella ; D. propinquella ; D. subpropinquella ; D. ciniflonella ; D. purpurea ; D. Capreolella ; D. Hypericella ; D. conterminella ; D. Angellicella ; D. Carduella ; D. ocellana ; D. Yeatiana ; D. applana ; D. ciliella ; D. granulosella ; D. rotundella ; D. depressella ; D. Pimpinellæ* ; *D. albipunctella ; D. emeritella ; D. pulcherrimella ; D. Douglasella ; D. Weirella ; D. Chœrophylli ; D. ultimella ; D. nervosa ; D. Libanotidella* (this is the recently discovered species taken at Newhaven) ; *D. badiella ; D. Pastinacella ;* and *D. Heracliana.*

The genus *Psoricoptera.* The insects assigned to this genus have the labial palpi reflexed, and the second with a brush-like tuft of hairs. The fore wings are of rather long proportion, and have raised tufts of

scales. The abdomen is rather depressed. The Caterpillars have sixteen legs. There is but one British species.

Psoricoptera gibbosella (the Powdered Gray, No. 7). The Caterpillar of this species feeds on Sallow in June. The perfect insect appears in July, and has been recently observed in the neighbourhood of Manchester, in Hainault Forest, and near Chesterfield. This species appears to be the same as the *Anacampsis Zephyrella* of Stephens.

The genus *Gelechia.* This genus, established by Zeller in 1839, contains most of the insects formerly comprised in Curtis's genus *Anacampsis.* The insects assigned to this extensive genus have the labial palpi reflexed, and the second joint without a conspicuous tuft of hairs in a brush-like form, as in the immediately preceding genera, being sometimes quite smooth. The fore wings are rather elongate in some of the species, but not in all. The hind wings are trapezoidal and more or less indented below the tip. In the present state of our classification of British Micro-lepidoptera, 101 species are assigned to this genus, many of which, there can be little doubt, will ultimately be otherwise located.

Gelechia terrella (the Sub-cinereous, No. 8). Though the perfect insect is one of the most abundant of our small moths, some uncertainty still prevails as to its preparatory stages. The Caterpillar has, however, been described as having the anterior segments black, with pale rings, and the hind ones pale greenish, with slender black streaks. The Moth is taken in woods and gardens in June, and is abundant everywhere.

The other species, of which only the names can be given, are :—*G. cinerella ; G. rufescens ; G. inornatella; G. gerronella ; G. vilella ; G. basalis ; G. Malvella ; G. Populella ; G. nigra ; G. temerella ; G. lentiginosella ; G. velocella ; G. fumatella ; G. ericitella ; G. mulinella ; G. divisella ; G. palustrella ; G. sororculella ; G. cuneatella* ; *G. peliella ; G. alacella ; G. longicornis ; G. diffinis ; G. desertella ; G. politella ; G. acuminatella ; G. Artemisiella ; G. senectella ; G. mundella ; G. similis ; G. affinis ; G. borcella ; G. Galbanella ; G. basaltinella ; G. domestica ; G. rhombella ; G. proximella ; G. notatella ; G. humeralis ; G. vulgella ; G. luculella ; G. scriptella ; G. fugitivella ; G. Æthiops ; G. solutella ; G. distinctella ; G. celerella ; G. costella ; G. maculea ; G. tricolorella ; G. fraternella ; G. maculiferella ; G. junctella ; G. vicinella ; G. Hubneri ; G. marmorea ; G. instabilella ; G. Atriplicella ; G. obsoletella ; G. littorella ; G. sequax ; G. aleela*, *G. leucatella ; G. albiceps ; G. nanella ; G. Mouffetella ; G. dodecella ; G. triparella ; G. tenebrella ; G. tenebrosella ; G. ligulella ; G. vorticella ; G. tæniolella ; G. Sircomella* ; *G. immaculatella ; G. nigritella ; G. Coronillella ; G. Anthyllidella ; G. atrella ; G. bifractella ; G. suffusella ; G. lucidella ; G. lutulentella ; G. Cerealella ; G. nigricostella ; G. gemmella ; G. nœviferella ; G. Hermannella ; G. pictella ; G. Brizella ; G. ericinella ; G. paupella ; G. inopella*, and *G. subocellea.*

The following are species that have only lately been added :—*G. viscariella ; G. leucomelanella ; G. ocellatella ; G. albipalpella ; G. arundinetella ; G. subdecurtella.*

The genus *Parasia.* The insects assigned to this genus have the second joint of the labial palpi rather long and scaly, and the terminal joint short and also scaly, nearly to the tip, instead of being entirely smooth and elongated, as in the preceding genus. The fore wings are rather long and narrow, and the hind wings distinctly indented below the tip. There are four British species.

Parasia Lapella (the Dingy Straw, No. 9). The Caterpillar of this species is white, with the head brown. It feeds within the seeds of the Burdock in October. The perfect Moth appears in the following June and July. It has been recently observed in abundance at Birkenhead, and also in plenty at Kingsbury, in Middlesex.

The other species are *P. Metzneriella*, distinguished by a suffusion of brown above the front and hind margins of the anterior wings, which are rather narrow ; *P. Carlinella*, which may be distinguished by a pale oblique band formed by the ground colour, and *P. Neuropterella*, distinguished by the deep brown colour of the veins.

The genus *Cleodora.* The insects assigned to this genus have the second joint of the labial palpi furnished with a brush-like tuft of hairs, longer than in other genera, and projecting forward. The wings are long and narrow, and have long fringes, the hinder pair being deeply indented below the tip. There are two British species.

Cleodora Cytisella (the Broom Cleodora, No. 10). The Caterpillar of this species is unknown. The perfect insect appears in July, and has recently been observed in great abundance near Bristol. It is also found in many other localities.

The other species, *C. striatella*, has the front wings of a grayish tone. The Caterpillar feeds on the stems of the Tansy.

The genus *Chelaria*. The insects assigned to this genus have the second joint of the labial palpi tufted, the terminal joint partly furnished with scales, but smooth and pointed at the tip, so as to resemble slightly the claw of a lobster, from which both the generic title and the popular name of the British species are derived. The front wings are moderately narrow, and the hinder pair acute at the tips, and slightly indented in the fringed margin. There is only one British species.

Chelaria Hubnerella (the Lobster-clawed, No. 11). The Caterpillar of this species remains undescribed, though the perfect insect is common. It appears in September and October, and has been recently observed in great abundance at Bristol, Darenth Wood, and Scarborough, and as Mr. Stainton informs us, at Newcastle, in *July*.

The genus *Anarsia*. The insects assigned to this genus have the second joint of the labial palpi tufted and scaly, and the terminal joint short and, in the male, nearly concealed in the scales of the long second. The female has the terminal joint of the palpi long and pointed. The hind wings are slightly indented at the fringed edge. There are two British species.

Anarsia Spartiella (the Furze Anarsia, No. 12). The Caterpillar of this species is described as dull brown, with the head and second segment nearly black. It feeds on the young shoots of Broom and Furze in June, and the perfect insect appears in July. It has been recently observed in great abundance on Wimbledon Common, and has been taken at many other places.

The other species, *A. Genistæ*, closely resembles *A. Spartiella*, but is much darker.


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PLATE LIX.

No. 1.—The Long-winged (*Ypsolophus fasciellus*).
No. 2.—The Dingy Streak (*Aplota palpella*).
No. 3.—The Durdhamian (*Nothris Durdhamella*).
No. 4.—The Parenthesis (*Sophronia parenthesella*).
No. 5.—The Light Streak (*Pleurota bicostella*).
No. 6.—The Geoffreyian (*Harpella Geoffrella*).
No. 7.—The Christiernian (*Hypercallia Christiernana*).
No. 8.—The Oliverian (*Dasycera Oliviella*).
No. 9.—The Woodian (*Œcophora Woodiella*).
No. 10.—The Four-spotted (*Œgoconia quadripuncta*).
No. 11.—The White-shouldered (*Endrosis fenestrella*).
No. 12.—The Great Raven-feather (*Butalis grandipennis*).
No. 13.—The Latreillian (*Pancalia Latreillella*).

The genus *Ypsolophus*. The insects assigned to this genus have the second joint of the labial palpi formed like a brush, from which the third joint issues, long and slender like a single protruding bristle. The wings are rather elongate and large in proportion to the body, the fringes being of moderate length. There are three British species.

Ypsolophus fasciellus (the Long-winged, No. 1). The Caterpillar of this species is described as pale yellowish gray, with three greenish lines on the back; the head and second segment dull orange. It feeds on the Sloe in September, the perfect Moth appearing in the following May. It was formerly taken near London, at Darenth Wood, New Forest, &c., but was considered rare. It has been recently captured at Lewes and Cambridge.

The other species are *Y. Juniperellus*, which is more of a gray tone in the front wings, and *Y. marginellus*, which is more buff than *fasciellus*.

The genus *Aplota*. The insects assigned to this genus have the labial palpi similar to those of *Ypsolophus*, but without the projecting bristle, the terminal joint being concealed in the scales of the second. The fore wings are somewhat linear with the apical margin, obliquely truncate. There is but one British species.

Aplota palpella (the Dingy Streak, No. 2). The Caterpillar of this species is undescribed. The perfect insect occurs in August, and has been taken at Ripley, and more recently in Hainault Forest.

The genus *Nothris*. The insects assigned to this genus have the labial palpi closely similar to those of the insects belonging to the genus *Ypsolophus*. The fore wings of rather narrow proportion, and the fringes are not variegated. There are two British species.

Nothris Durdhamella (the Durdhamian, No. 3). The Caterpillar of this species has the anterior segments blackish, the rest of the body being yellowish white, with brown lines on the back. It feeds in rolled-up leaves of different species of Thyme, in June. The perfect insect appears in July. It has been recently taken at Teignmouth, Darenth Wood, Deal, and other places.

The other species is *N. berbascella*, which is much paler in the general colour, and the Caterpillar, which is dull brown with the head and next segment black, feeds in leaves of the *Verbascum*.

The genus *Sophronia*. The insects assigned to this genus have the palpi as in *Ypsolophus*. The front edge of the wings has generally a light streak, so that when they are closed in repose, being very narrow, the general appearance of the insect is that of a short dark line with a white edge on each side. There are two British species.

Sophronia parenthesella (the Parenthesis, No. 4). The Caterpillar of this species, though the moth was well known in the time of Linnæus, still remains undescribed. The perfect insect appears in June and July, and has been recently taken in great abundance at Manchester, and in sufficient plenty at other places.

The other species, *S. humerella*, has the front wings of a bright light brown, with a white line down the front. The Caterpillar feeds between the leaves of *Artemisia campestris*.

The genus *Pleurota*. The insects assigned to this genus have the labial palpi rather long and compressed, the second joint thickly clothed with hair, and the terminal joint short, slender, and smooth. The wings are narrow and pointed, and the hind wings are indented at the fringed edge near the points. There is but one British species.

Pleurota bicostella (the Light Streak, No. 5). The Caterpillar of this species is unknown, but the perfect insect is very plentiful and appears in May and July. It has been recently observed in great abundance at Birkenhead, Manchester, Scarborough, and several other places.

The genus *Harpella*. The insects assigned to this genus have the labial palpi long and compressed. The second joint is scaly, and the terminal one slender and pointing upwards. The wings are ample, and the fringes of the hind wings rather deep. There are two British species.

Harpella Geoffrella (the Geoffreyan, No. 6). The Caterpillar of this species is unknown. The perfect Moth appears in May and June and is very abundant in most places. It has been recently observed in great abundance at Kingsbury in Middlesex, Tenterden in Kent, Bristol, and many other localities.

The other species, *H. Bracteella*, is only recently established as British, having been taken near Gateshead. It has the front wings bright yellow at the base, and from the middle to the end dark brown ; on the front edge a dark bluish streak at the base, and a yellow spot in the brown towards the tip. There are also some transverse bluish streaks in the dark portion of the wing. The larva feeds in decayed wood in February and April. It is of a dull gray colour with a brown head, and the second segment has two brown plates.

The genus *Hypercallia*. The insects assigned to this genus have the labial palpi greatly elongated and bent outward and upward, the terminal joint being perpendicular. The antennæ are of moderate length, and slightly pubescent in the males, the wings are long and angular. There is but one British species.

Hypercallia Christiernana (the Christiernian, No. 7). The Caterpillar of this species is greenish gray, with a whitish line along the back. The head and second segment are greenish gray. It feeds on *Polygala* in May. The perfect Moth appears in June and July. This pretty insect, with its yellow wings delicately chequered with scarlet, is sure to attract the attention of the young collector by its beauty, but it is not often met with. Mr. Stephens first took it at Darenth Wood, and it has since been taken at Sevenoaks, Greenhithe, and Castle Eden Dene.

The genus *Dasycera*. This genus with the six following, *Œcophora*, *Œgoconia*, *Endrosis*, *Butalis*, *Atemelia*, and *Pancalia*, are formed by some authors into a separate family, distinguished as the *Œcophoridæ*, as the genus *Œcophora* alone furnishes more than half the species of which it is composed. I shall, however, follow the arrangement at present in use in the collection of the Museum, though it is possible that the one just referred to will be eventually adopted, as it appears to be founded upon sufficient affinities of the genera so grouped together. The genus *Dasycera*, here considered as belonging to the family *Gelechidæ*, may be characterised as follows. The antennæ thickened at the base with hairy scales. The labial palpi reflexed and very short, with the terminal joint slender and pointed ; the front wings elongate, and the hind wings having an abrupt angle next the body. There are two British species.

Dasycera Oliviella (the Olivierian, No. 8). The larva of this pretty insect is unknown. The perfect Moth appears in July and August. It has been recently taken at Kingsbury, Lewes, Plymouth, and other places.

The other species, *D. sulphurella*, has the front wings brown, dusted with yellow, with two yellow streaks from the base, and a small yellow patch on the inner margin, and a smaller one on the front margin; the hind wings are pale yellow, brownish at the tips. It is a very abundant species, and several localities are recorded where it has been recently noticed in very great abundance, as Bristol, Cambridge, Lewes, Manchester, Kingsbury, &c., &c.

T he genus *Œcophora*. The insects assigned to this somewhat extensive genus have the antennæ of the males ciliated. The labial palpi are short. The wings vary in form in the different species, but are nearly all of different shades of yellow. There are seventeen British species.

Œcophora Woodiella (the Woodian, No. 9). This beautifully marked insect is the rarest of the genus to which it belongs, and indeed may be almost considered unique, as only a single specimen appears to have been taken—the one described by Mr. Stephens as having been captured by Mr. R. Wood in the month of June, on Kersall Moor, near Manchester, now some years ago. As the time of its appearance is thus known, collectors should look out for it at the proper season in likely situations, and other specimens will doubtless reward a persevering search. It is almost the only species of the genus which is very rare, most of the others, many of which are very pretty, being sufficiently plentiful, though some few are rather local.

The other species are, *Œ. minutella; Œ. flavimaculella; Œ. tripuncta; Œ. similella; Œ. augustella; Œ. grandis; Œ. formosella; Œ. lunaris; Œ. Lambdella; Œ. subaquilea; Œ. Panzerella; Œ. tinctella; Œ. unitella; Œ. flavifrontella; Œ. fuscescens;* and *Œ. pseudo-spretella.* Many of these are very prettily marked with bright tones of yellow, brown, or ochre, and several of them are very common, as *minutella* and *pseudo-spretella*, for instance; while *formosella*, *grandis*, and one or two others, are comparatively scarce.

The genus *Œgoconia.* The insects assigned to this genus have the head tufted at the back, the antennæ rather short and robust, the wings of long proportion, and the hind wings not transparent at the base. There is only one British species.

Œgoconia quadripuncta (the Four-spotted, No. 10). The Caterpillar of this species is unknown. The perfect Moth appears in August and September. It has been recently observed in the neighbourhood of Bristol in some profusion, and has been taken near London in houses.

The genus *Endrosis.* The insects assigned to this genus have the head devoid of the posterior tuft which distinguishes the last genus. The antennæ are rather long and slender, and the wings are long, the hinder pair being transparent at the base. There is but one British species.

Endrosis fenestrella (the White-shouldered, No. 11). The Caterpillar of this species is nearly white, with the head and second segment brown. It feeds on decayed wood and other waste substances in December and January, and the perfect Moth appears near the same time. It is very common in houses.

The genus *Butalis.* The insects assigned to this genus have the head blunt, broad, and retracted. The antennæ are slightly ciliated in the males. The palpi are short and pointing upwards. The body is short and thick. The fore wings are long and the hind pair pointed; in repose they are folded closely over the body which they entirely conceal. There are nine British species.

Butalis grandipennis (the Great Raven-feather, No. 12). The Caterpillar of this species is dark olive green, with a pale line along the back and a darker line on each side. The head is brown and the whole body is sprinkled with black specks. It feeds on Furze in January and March. It has been recently observed in great profusion near Birkenhead, Bristol, Manchester, Wimbledon Common, &c., &c.

The other species are, *B. fusco-ænea; B. senescens; B. fusco-cuprea; B. Cicadella; B. variella; B. Chenopodiella; B. torquatella;* and *B. incongruella.* Most of them are of a dull, dark greenish or brownish tone, some of the species having a few white or yellowish marks.

The genus *Pancalia.* The insects assigned to this genus have the head retracted and obtuse. The palpi are reflexed, and have the second joint smooth, and the terminal joint pointed. The wings are narrow. There are two British species.

Pancalia Latreillella (the Latreillian, No. 13). This handsome insect appears in June, but is not common. It has been recently observed near Edinburgh, and at Epping, Lewes, and Plymouth. The female may be distinguished by a ring of pure white near the tips of the antennæ.

The other species, *P. Leuwenhoekella*, is much more common than the preceding. It is very like in colour, but invariably smaller, and both sexes have the rings of white near the tips of the antennæ.


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PLATE LX.

No. 1.—The Granitellian Acrolepia (*Acrolepia granitella*).
No. 2.—The Brown Copper (*Roslerstammia Erxlebella*).
No. 3.—The Fuesslian (*Glyphipteryx Fisheriella*).
No. 4.—The Dentellated Æchmia (*Æchmia dentella*).
No. 5.—The Small Shining Brown (*Perittia obscurepunctella*).
No. 6.—The Satin Pigmy (*Tinagma sericiellum*).
No. 7.—The Ocnerostomellian (*Douglasia Ocnerostomella*).
No. 8.—The Gold I. W. (*Argyresthia Brockeela*).
No. 9.—The Slight-barred (*Cedestis farinatella*).
No. 10.—The Pine Ocnerostoma (*Ocnerostoma Piniariella*).
No. 11.—The Small Ochreous Zelleria (*Zelleria hepariella*).

The sixth family of the sub-division *Tineina* is that of the *Glyphipterygidæ*. The insects comprised in this family when in the perfect state have the head generally smooth, and the maxillary palpi so short as to be scarcely perceptible. The fore wings are either oblong or elongate ; the hind wings sometimes rounded at the tip, but in other species very narrow and pointed. Their time of flight is diurnal. In the Caterpillar state they have generally sixteen legs, but in some species the larvæ are nearly maggot-formed, and without any perceptible feet. Many of the species are gaily coloured and attractive insects, though their small size causes them often to be overlooked by young collectors. Most of them are common, though two of the species, *Acrolepia Betulella* and *Roslerstammia Pronubella*, are very rare. There are twenty-two British species comprised in the eight genera belonging to this family.

The genus *Acrolepia*. The insects assigned to this genus have the extreme crown of the head rough. The labial palpi are thick, but have the terminal joint pointed. The fore wings are generally elongate, the hind wings being sometimes rounded and sometimes pointed at the tip. The Caterpillar has the full complement of sixteen legs, and feeds in the interior of leaves. The Chrysalis is formed in a cocoon of open network. There are four British species.

Acrolepia granitella (the Granitellian Acrolepia, No. 1). The Caterpillar of this species is pale yellowish green with a dark line along the back. It feeds in June and July in the leaves of *Inula dysenterica*. The perfect insect appears in July and September. It has been recently observed in great abundance near Scarborough, and Chudleigh.

The other species are *A. Perlepidella*, having the fore wings orange suffused with black and variegated with pale yellow markings ; *A. pygmœana* which has the front wings marbled with white and brown ; and *A. Betulella*, which has the front wings brown mottled with darker brown. This last species is extremely rare.

The genus *Roslerstammia*. The insects assigned to this genus have the antennæ thick and long, and the labial palpi short and drooping. The front wings are of moderate length and breadth, and the hind wings rounded at the tip. The Caterpillars of this genus, as far as the indigenous species are concerned, remain undescribed. There are two British species, one of which is, however, so rare, as to render it doubtful as a native insect.

Roslerstammia Erxlebella (the Brown Copper, No. 2). This pretty insect appears in May and June. It has been observed recently in some plenty at Bristol, and its presence has also been recorded at Worthing and other places.

The other species, *R. Pronubella*, has the front wings of shining golden green, rather yellowish along the

front edge. The hind wings are yellowish with the margins and fringe brown. This handsome little insect has only been taken once, in Sutherlandshire, in the summer of 1854.

The genus *Glyphipteryx.* This genus, the typical one of the family, contains eight British species, all of which are remarkable for the splendid colours of their wings, the surface of which though so small is rich in the finest metallic hues, from bright green to the richest red bronze, often enriched with raised bosses of scales of bright golden appearance. The principal characteristics of the genus are the following. The head is smooth; the antennæ slender and rather short. The labial palpi are short, drooping, diverging outwards, and having a tuft of bristly hairs beneath. The form of the wings varies, in both pairs. The Caterpillars have the full complement of sixteen legs, and feed in the interior of leaves and seed-vessels.

Glyphipteryx Fisheriella (the Fuesslian, No. 3). This pretty insect is one of the commonest of the genus. It appears in May and again in July, and has been recently observed in great abundance at Birkenhead, Bristol, Newcastle-on-Tyne, and many other places.

The other species are, *G. fuscoviridella*, which has the front wings of shining bronze-like green, with a white streak along the front edge; *G. Cladiella*, which is of a darker metallic green; and *G. Thrasonella*, which is of a dark metallic green with bluish silvery streaks; while *G. Haworthana*, *G. equitella*, *G. oculatella*, and *G. Schœnicolella*, all very closely resemble the species figured as an example.

The genus *Æchmia.* The insects assigned to this genus have the antennæ rather thick, the head smooth, and the labial palpi short, drooping, and slender. The fore wings are rather broad, and distinguished by a projecting tuft of scales on the inner margin. There is but one British species.

Æchmia dentella (the Dentellated Æchmia, No. 4). This species exhibits conspicuously the protruding tuft of scales on the hinder margin of the fore wings. It appears in May and June, and has been observed recently in some plenty at Cambridge, and noticed in several other localities. The Caterpillar remains as yet unknown.

The genus *Perittia.* The insects assigned to this genus have the antennæ very slender, the labial palpi longer than in the last genus and more slender. The fore wings are of long proportion, and the hind wings narrow and pointed. The Caterpillar, like most others of the family, feeds in the interior of leaves. There is but one British species.

Perittia obscurepunctella (the Small Shining Brown, No. 5). The Caterpillar of this species is of a grayish tone verging on green, the head being dark brown. It feeds on the tissue of the leaves of the Honeysuckle, in July, the perfect insect appearing late in the autumn, after which it hybernates, to reappear early in the following spring. It has been recently observed at Lewisham in some abundance, and its appearance has been recorded in many other places.

The genus *Antispila.* The insects assigned to this genus have the head smooth, and the labial palpi short and drooping, the antennæ being much shorter than in the preceding genus. The fore wings are rather obtusely, and the hind wings acutely pointed. The main distinction, however, is found in the larva state, the Caterpillar being apodal, or entirely without feet. Like those of the rest of the family, however, it feeds in the interior of leaves. There are two British species.

Antispila Pfeifferella (the Pfeifferian). I have not been able to procure a specimen of this pretty species, but the following description will enable the collector to recognise it. The front wings are of a metallic golden brown getting redder at the back; near the base is a narrow angulated band of bright metallic gold colour, and beyond the middle are two angular spots of the same colour. The hind wings are pale brown, with fringes of a moderate depth. The Caterpillar is of a pale leaden green, with head and second segment brown. It feeds in the leaves of the Common Dogwood, in May, and the perfect insect appears in June and July. It has been recently noticed in plenty at Bristol, Scarborough, and other places.

The other species, *A. Treitschkiella*, is very like the preceding, but invariably smaller, and the markings are less sharply defined, and the golden band less angulated.

The genus *Tinagma.* The Caterpillar of this genus, like that of the preceding, is apodal, being entirely without legs, and feeding in the interior of leaves. In the perfect insect the antennæ are short and thick; and the labial palpi short, slender, and pointing downwards. The front wings have the fringes deepened at the posterior angle. There are three British species.

Tinagma sericiellum (the Satin Pigmy, No. 6). The Caterpillar of this pretty little species, remains undescribed, though the perfect insect is very common. It appears in May, and has been recently observed at Lewes and at Scarborough, in very great abundance, and plentifully in several other localities.

The other species are: *T. Stanneellum*, of a rather paler bronzy gray, with a faint white spot on the inner margin of the fore wings, and *T. resplendellum*, which may be at once distinguished by the much darker tone of its bronzy gray and its two white spots on the inner margin of the anterior wings. The Caterpillar of this species is well known. It is of a dull yellowish green, with a brown head; it is without legs, and feeds in the leaves of the Alder.

The genus *Douglasia*. The insects assigned to this genus have the head smooth, and the antennæ thick and rather short. The labial palpi droop and have the tip *blunt*. The fore wings are long and narrow, and the hind wings are pointed. There is but one British species.

Douglasia Ocnerostomella. The Caterpillar of this species remains undescribed. The perfect insect appears in July, and has been recently observed at Mickleham, in great abundance. It has also been seen at Brandon, in Suffolk.

The seventh family of the sub-division *Tineina*, is that of the *Argyresthidæ*. The general characteristics of the genera comprised in this family, are the following. The back of the head rough, the front smooth, the labial palpi short, and the terminal joint generally *blunt*. The front wings are long and narrow, and the hind wings pointed, with deep fringes. The insects belonging to the most numerous genus of the family, *Argyresthia*, are distinguished by the peculiarity of their position when in repose, the head being held down close to the substance on which the insect is resting, and the body pointing upwards. Most of the species are summer insects, but the Zellerias generally appear in the autumn, and after hybernation come forth again in spring. There are twenty-two British species in this family distributed in four genera.

The genus *Argyresthia*. The insects assigned to this genus have the fore part of the head smooth, and the hinder part rough. The labial palpi have the terminal joint rather pointed. The fore wings are long and narrow, the hind wings lanceolate. There are twenty-two British species in this extensive genus.

Argyresthia Brockeela (the Gold I. W., No. 8). The rich silver white of the fore wings of this pretty insect is so conspicuously marked with golden brown, forming the letters I. W., that it is not likely to escape the attention of the young collector. The Caterpillar feeds on the young shoots of the Birch, in March and April, and the perfect insect appears in June and July. It is very abundant, and has been recently observed in great profusion at Birkenhead, Bristol, Newcastle-on-Tyne, and many other places, generally in or near woods.

The other species are the following: *A. Ephippella*, with the front wings ochreous brown, with a white streak at the inner edge. *A. nitidella*, paler ochreous brown, with a dark streak at the base, and the inner margin white. *A. purpurascentella*, by some considered a doubtful species. *A. semitestacella*, with the fore wings ochreous, and a white line at the inner margin for half the length, then terminating in a dark spot. *A. spiniella*, with the fore wings yellowish brown, and the inner margin white, with an indistinct dark band across the middle, and white spots near the tip. *A. Albistria*, with the front wings purplish brown, margined with white at the inner edge to the middle, where the white line terminates in a dark spot. *A. conjugella*, with the front wings purplish tawny, a white streak at the inner edge, and a dark spot near the middle, both at the front and back edges. *A. semifusca*, dark brownish purple with a white streak half-way up the inner edge, and white spots near the tip. *A. mendica*, with the front wings purplish gray, the inner margin white, and a dusky brown band across the middle. *A. Glaucenella*, with the front wings grayish bronze, the usual inner margin of white, and a dull transverse band of dusky brown. *A. Retinella*, with fore wings white, shaded softly with tawny in front, and marked with tawny bands and patches. *A. aldominalis*, with fore wings white, marked with streaks, and patches of yellow. *A. dilectella*, with front wings shining golden straw-colour, with some darker markings. *A. Andereggiella*, with the front wings white and a deep gold-coloured mark on the inner margin, and other paler marks. *A. curvella*, with white fore wings marbled with grayish brown, and having a transverse band of the same colour. *A. Sorbiella*, with the front wings yellowish white, in part marbled and spotted with golden-brown. *A. Pygmæella*, with the front wings shining greenish white, with pale golden spots. *A. Gædartella*, with front wings white, suffused with several

golden bands and spots. *A. literella*, which is a great rarity, has the front wings white, with slender golden transverse bands. *A. arceuthina*, with the front wings entirely of a shining bronzy green. *A. præcocella*, with the front wings of a shining pale ochre, flushed with a tinge of violet. *A. Aurulentella*, with front wings of the same colour as the preceding species, but having the inner margin white, and the head white, instead of whitish yellow; and *A. decimella*, which is however a doubtful species.

The genus *Cedestis*. The insects assigned to this genus have the labial palpi short and smooth, thickened with scaly hairs. In repose the insects do not lower the head and elevate the abdomen, as in the preceding genus. There are two British species.

Cedestis farinatella (the Slight-barred, No. 9). The Caterpillar of this species is pale brownish green, with the head and second segment black. It feeds in the foliage of the Scotch Fir, in February and March, and the perfect insect appears in June and July. It has been recently observed in great abundance near Scarborough, at Darenth Wood, and in other localities.

The other species, *C. Gysselinella*, which is very rare, resembles the preceding, but may be distinguished by the more yellow, or rather golden, tone of the markings.

The genus *Ocnerostoma*. The insects assigned to this genus may be at once distinguished from the preceding, by the apparent absence of the palpi, which are so short as to be almost imperceptible. There is but one British species.

Ocnerostoma Piniariella (the Pine Ocnerostoma, No. 10). The Caterpillar of this species is deep glossy brown, the head and second segment black. It feeds in the foliage of the Scotch Fir, in March and May; the perfect insect appearing in April, May, and July. It has been recently noticed in great abundance in several widely distant localities.

The genus *Zelleria*. The insects assigned to this genus have the head smooth in front, and rough at the back; the antennæ are short and thick. The labial palpi are short and scaly, and pointed upwards, having the terminal joint blunt. The fore wings are slightly hooked and the hind wings pointed. There are three British genera, all more or less scarce, and the larva of all of them remain as yet undescribed.

Zelleria hepariella (the Small Ochreous Zelleria, No. 11). The time of the appearance of the Caterpillar of this species is unknown, but the perfect insect comes forth in August and October, being most probably double-brooded, the insects of the last brood appearing again in the early spring after hybernation. It has been taken at Pembury, Castle Eden Dene, Mickleham, and Conway.

The other species are the following: *Z. insignipennella*, which is larger than the preceding, and has the inner margin paler, is thought by some to be only a variety of the preceding. *Z. fasciapennella* is very distinct, having the fore wings of a pale gray-colour, with a darker tone of the same colour, and marked with four longitudinal rows of very small black dots. It has been taken on the Pentland Hills, near Edinburgh.


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PLATE LXI.

No. 1.—The Confluent-barred (*Gracilaria Syringella*).
No. 2.—The Obscure-streaked (*Coriscium Brongniardellum*).
No. 3.—The White-spotted Brown (*Ornix guttea*).
No. 4.—The Lead-coloured (*Celeophora murinipennella*).
No. 5.—The Sluggish Bedellia (*Bedellia somnulentella*).
No. 6.—The Nonpareil (*Cosmopteryx Drurella*).
No. 7.—The Poplar Border (*Batrachedra præangusta*).
No. 8.—The Yellow V (*Oinophila V-flava*).
No. 9.—The Hook-tipped (*Chauliodus Illigerellus*).
No. 10.—The Little Black (*Laverna atra*).
No. 11.—The Linnæan (*Chrysoclista Linneella*).
No. 12.—The Rœsellian (*Heliodines Rœsella*).
No. 13.— (*Anybia langiella*).
No. 14.—The Dalean Asychna (*Asychna terminella*).
No. 15.—The Narrow-winged (*Chrysocorys festaliella*).
No. 16.—The Four-spotted Gold (*Elachista Pfeifferella*).
No. 17.—Albin's Elachista (*Elachista Albinella*).
No. 18.—The Red Feather (*Tischeria complanella*).
No. 19.—The Hazel Red (*Lithocolletis corylifoliella*).
No. 20.—The Tawny Treble-bar (*Lithocolletis trifasciella*).
No. 21.—The Clerckian (*Lyonetia Clerckella*).
No. 22.—The Simple Dot (*Phyllocnistis saligna*).
No. 23.—The Gold Dot (*Cemiostoma spartifoliella*).
No. 24.—The Eared (*Opostega auritella*).
No. 25.—The Elm (*Bucculatrix Ulmella*).
No. 26.—The Pigmy Trifurcula (*Nepticula floslactella*).
No. 27.—The Creamy Pigmy (*Trifurcula immundella*).
No. 28.—The Plumeless Plume (*Adactylus Bennetii*).
No. 29.—The Rose Plume (*Pterophorus rhododactylus*).
No. 30.—The Caterpillar of the Rose Plume.
No. 31.—The Chrysalis of the Rose Plume.
No. 32.—The Large White Plume (*Pterophorus pentadactylus*).
No. 33.—The Many-cleft Plume (*Orneodes polydactylus*).
No. 34.—The Caterpillar of the Many-cleft Plume.
No. 35.—The Chrysalis of the Many-cleft Plume.
No. 36.—The Caterpillar of the Citron Plume (*Pterophorus acanthodactylus*).
No. 37.—The Chrysalis of the Citron Plume.
No. 38.—The Caterpillar of the Common Plume (*Pterophorus Pterodactylus*).
No. 39.—The Chrysalis of the Common Plume.

The eighth family of Micro-lepidoptera, of the sub-division *Tincina*, is that of the *Gracilariidæ*. The insects grouped in this family are distinguished from the neighbouring group of *Argyresthidæ* by their position when at rest. In direct contrast to the last named group of insects, the *Gracilariidæ* pose themselves when at rest with the head considerably raised from the object upon which they are settling. Many of the species are very common, especially the pretty insect forming my illustration of the genus *Gracilaria*, which is extremely abundant in gardens in all parts of the country. With regard to their period of appearance, the group in general being double-brooded, the first brood of the year appears in summer, and the next brood passes the winter in the chrysalis state, emerging in the first genial weather of the earliest days of spring. Some few, however, like *G. stigmatella*, appear at the close of autumn, the later specimens appearing again in spring, after a season of hybernation during the severe winter months. There are three genera in this group or family, containing collectively twenty-seven species. Three species of *Graeilaria* are considered rare :—*G. straminella*, *G. Ononidis*, and *G. imperialella ;* and of *Ornix Devoniella* only one British specimen has been taken.

The genus *Gracilaria*. The insects assigned to this genus have the head without tuft, the labial palpi pointing upwards, the second joint being scaly, but without "pencils" of hairs ; the terminal joint is pointed. The front wings are rather lance-shaped, and the fringes of both pairs of moderate depth. There are sixteen British species.

Gracilaria Syringella (the Confluent-barred, No. 1). The larva of this elegant little insect feeds on the foliage of Lilac, Privet, Ash, &c., and is sometimes so abundant as to be deemed one of our garden pests. The species is double-brooded, the first Caterpillars being hatched in June, and the second brood in September. The perfect insects of the first brood appear in July, and of the second not till the following May. The species may be said to be abundant everywhere.

The other species are *G. Swederella ; G. stigmatella ; G. stramineella ; G. hemidactylella ; G. falconipennella ; G. semifascia ; G. populetorum ; G. elongella ; G. tringipennella ; G. omissella ; G. phasianipennella ; G. auroguttella ; G. quadruplella ; G. Ononidis ;* and *G. imperialella.* Several of these are very pretty insects, their delicately fringed wings suggesting the idea of variegated feathers, from which fancied resemblance many of the specific names have been founded, as *phasianipennella*, &c. Some of the species have the lighter marks of the wings distinguished by a metallic or golden gloss, as *auroguttella. Stigmatella* may be at once distinguished by a large dash of pale cream-colour, of an arrow-headed form, in the centre of the dark brown fore wings, and *omissella* by five delicate diagonal streaks of white on each of the fore wings. Three of the species are rare :—First, *stramineella*, which has the front wings pale straw-colour, with brown markings, and has been found in the Lake district, and in Stirlingshire. Secondly, *Ononidis*, which has the front wings dark, with nine silvery spots, and has been taken near Cambridge, Pembury, and Mickleham. Thirdly, *imperialella*, which is, perhaps, the most brilliantly tinted of the genus, having the front wings of a bright metallic golden colour, with four silvery streaks. This last has been taken at Cambridge, and at Glanville Wootton, Dorset, &c., &c.

The genus *Coriscium.* The insects assigned to this genus may be well distinguished from those assigned to the preceding one by the marked distinction in the structure of the labial palpi, which have the second joint furnished with a tuft or pencil of hairs. The front wings are suddenly widened at the fringed edge by a slight projection, which gives them a much less pointed character than in the last species. There are three British species.

Coriscium Brongniardellum (the Obscure-barred, No. 2). This species is generally described as having the front wings of a grayish brown, with four whitish oblique streaks ; but the streaks are so broad in many specimens, that they give the wings the appearance of having a pale-brown for the ground colour, strongly maculated with a deepish gray-brown. It has a minute black hook in the apical fringes. The Caterpillar of this species is pale greenish, with dark green along the back, and the head brown. It feeds on the Oak in June and July, and the perfect insect appears in July and September. It has appeared recently in abundance near Bristol, and still more abundantly at Guildford. The other species are *C. cuculipennellum*, which has the front wings pale gray, with four dark bands, and *C. sulphurellum*, which has the fore wings of a pale sulphureous yellow, more or less strongly speckled with brown.

The genus *Ornix.* The insects assigned to this genus have the second joint of the labial palpi clothed with scales, without hairs. The front wings are slightly concave in front, and much more lancet-shaped at the points than in the last species. There are nine British species.

Ornix guttea (the White-spotted Brown, No. 3). The well-defined angular marks of white on a rich brown ground which distinguish the front wings, make this species one of the most easily distinguished of the genus. The Caterpillar is yellowish, getting dark green along the back. It feeds in curled Apple leaves, in July, and passes the winter in the Chrysalis state, the Moth appearing in the following May and June. It is a common insect, and has recently been noticed at Scarborough and other places in great abundance.

The other species are *O. Avellanella ; O. Devoniella ; O. Anglicella ; O. Betulæ ; O. scitulatella ; O. torquilella ; O. Scoticella ;* and *O. Loganella.* Most of these species have the front wings of different tones of grayish, more or less speckled with brown, on deeper gray. *Loganella*, however, has the front wings very dark brown, with white streaks and dots ; and the rare *Devoniella*, of which only one specimen has, as yet, been taken, near Dawlish, has the front wings of an ochreous tone, with a single dark spot.

The ninth sub-family of this division of Micro-lepidoptera is that of the *Coleophoridæ.* This group is a very distinct one. In the perfect insect the antennæ are rather long, have generally a tuft of slender hairs at the base, and are pointed forward when the insect is in repose. The wings are of long proportion, and very distinctly

lancet-formed. The Caterpillar forms a case in which it not only resides during its feeding time, as it eats into the interior of leaves and seeds, but also remains within it during its change to the Chrysalis state. The form of the case is often the best guide for determining the species. The perfect insect generally appears between May and August, and most of them are tolerably common. They are very variously marked, though all but one belonging to the same genus. Some have the front wings of an almost uniform pale colour, others bright metallic green, others yellowish or brownish, with brown lines and spots, and others a fine white ground, with yellow or brown marks. There are fifty-four species, all of which, with one solitary exception, belong to the genus *Coleophora*. The single exception, which is newly added to our British catalogue, forms a separate genus, *Goniodoma*.

The genus *Coleophora*. In this numerous genus the antennæ of the perfect insect differ in some of the species, being sometimes only scaly at the base, but in other species furnished with a tuft of hairs. The wings are lancet-shaped. The Caterpillar forms a more or less cylindrical case, which serves also as a sort of cocoon to the chrysalis. There are fifty-three British species.

Coleophora murinipenella (the Lead-coloured, No. 4). This insect varies a good deal in the apparent colour of the fore wings, in consequence of the veins being more or less broadly marked by gray or a deeper colour, which sometimes nearly conceals the white ground colour. The Caterpillar resides in a stiff whitish case, and feeds on the seed-vessels of Luzula in June. The perfect insect appears in the following May. This species has been recently observed in great abundance at Scarborough, and may be said to be generally rather common.

The other species of *Coleophora* are:—*C. Fabriciella; C. deauratella; C. alcyonipennella; C. Frischella; C. paripennella; C. Woekeeella; C. ochrea; C. binotapennella; C. Lixella; C. vibiceella; C. conspicuella; C. pyrrhulipennella; C. albicosta; C. Vulnerariæ; C. anatipennella; C. palliatella; C. currucipennella; C. niveicostella; C. discordella; C. saturatella; C. Onosmella; C. therinella; C. troglodytella; C. lineolea; C. cæspititiella; C. annulatella; C. argentula; C. hemerobiella; C. juncicolella; C. Laricella; C. albitarsella; C. nigricella; C. fuscedinella; C. orbitella; C. gryphipennella; C. viminetella; C. olivaceella; C. solitariella; C. lutipennella; C. badiipennella;* and *C. chalcogrammella.*

Among the most remarkable of these are, perhaps, the following. *Solitariella*, with the front wings shining brownish yellow, with gray fringe, the hind wings being entirely gray; some of the more darkly coloured kinds also appear at a glance very distinct, as, for instance, *albitarsella*, having the front wings of a rich glossy violet black; the antennæ becoming white at the tip. The bronzy green kinds have also a very distinct appearance; and among them may be noted *Frischella*, with the front wings of brilliant metallic green, and the antennæ white-tipped; *chalcogrammella* is also a handsome species, the front wings being bright yellow, with deep brown bronzy streaks. The white, and the gray winged species are far less remarkable.

The genus *Goniodoma*. The solitary British insect assigned to this genus is *G. auroguttella*. It is of extreme rarity; having only been taken on one occasion, at Yarmouth in the Isle of Wight. The front wings of this pretty species are yellow, with two silvery longitudinal streaks terminating near the middle; and on the broad part of the extremity are several metallic golden spots, bordered with black.

The tenth family of the subdivision *Tineina* is that of the *Elachistidæ*. In the perfect state the head is generally smooth; the labial palpi slender, recurved, and pointed. The fore wings are moderately elongate; the hind wings being narrowly lancet-shaped, or sometimes almost linear, with fringes on both sides. There are fifteen genera in this family, which include eighty-five British species. This group of small moths generally fly at, or shortly before dusk. The larvæ appear early in the year; those of most of the species as early as March or April; and, in most cases, the perfect insect appears between May and August. The Caterpillars of this family, unlike those of the last group, are without *cases*.

The genus *Bedellia*. The insects assigned to this genus have the head rough, and the labial palpi short, and pointed forward. The fore wings are of the narrow lancet-formed kind, and the hind wings so narrow as to be almost linear. There is only one British species.

Bedella somnulentella (the Sluggish Bedellia, No. 5). The larva of this species is pale green, purplish

towards the head, which is brown. It is also distinguished by two rows of dark violet spots. It feeds on the leaves of the Convolvulus in August and September, and the perfect insect appears in October. In the perfect state it is of very retired habit, and not easily found. It has been recently taken at Lewisham, Bideford, and other places.

The genus *Stathmopoda*. The insects assigned to this genus have the antennæ furnished with delicate long hairs. There is but one British species.

Stathmopoda pedella (the Scarce Stathmopoda). Only a single specimen of this rare species has been taken, at Brandon in Suffolk. I have not been able to procure a specimen to make a drawing from.

The genus *Cosmopteryx*. The insects assigned to this genus have the head smooth; the antennæ are distinguished by a very long basal joint. There are two British species.

Cosmopteryx Drurella (the Nonpareil, No. 6). This is the *Gracillaria eximia* of Haworth. It is impossible on the minute scale of a drawing of the natural size to do justice to the extreme richness and metallic enrichment of the colouring of the narrow lancet-shaped wings of this beautiful insect. They are varied with black, orange, violet, gold and other blending tints, which, among the several splendid species of the minute *Tineinæ*, render it perhaps the most magnificent. Fabricius named this beautiful species after the well-known English entomologist Drury, who, it was thought, was the first to discover it; but this designation seems likely to be superseded as a specific distinction by the one more generally adopted—*eximia*. The larva, which is white, delicately streaked with crimson, feeds on Hop, in August and September, and the perfect insect appears in the following July. Lewisham, Hackney, and places near London are cited for its capture.

The other species, *C. Lineigiella*, is dark fuscous, streaked and speckled with metallic markings, but it is not so rare or so splendid as *Drurella*.

The genus *Batrachedra*. The insects contained in this genus, in contradistinction to those of the preceding one, have the basal joint of the antennæ short. There are two British species.

Batrachedra præangusta (the Poplar Border, No. 7). The larva of this species feeds on Poplar and Willow in May, and the perfect insect appears in July. It is extremely abundant in various localities.

The other species, *B. pinicolella*, is of more ochreous tone in the fore-wings, marked indistinctly with brown.

The genus *Oinophila*. The insects assigned to this genus have the palpi short and pointing forward, and the antennæ slender and rather long. There is only one British species.

Oinophila V-flava (the Yellow V, No. 8). The popular name of this insect arises from the supposed resemblance to a V in the principal of the fore wings. The form is, however, very indistinct. The Caterpillar is whitish with a brown head, and feeds on Fungi, and also in houses on old corks. At Bristol and in London, it has been observed in wine vaults in some abundance.

The genus *Chauliodus* is principally distinguished by the tooth-like projections on the inner margin of the fore wings. There are three British species.

Chauliodus Illigerellus (the Hook-tipped, No. 9). The front wings of this species are sometimes slightly sub-falcate, but scarcely enough to justify the specific name of Hook-tip. The Caterpillar is yellowish green, the head being more yellow. It appears in May and June, and the perfect insect in July. It has been recently observed in some abundance near Cambridge.

The other two species are *C. insecurellus*, the fore wings dull whitish with a pale brown band; and *C. Chærophyllellus*, which has the fore wings of a light brown, with a broad central band of darker tone.

The genus *Laverna*. The insects assigned to this genus have raised tufts of scales on the fore wings, and the hind wings are very slenderly lancet-shaped, and very pointed. There are eleven British species.

Laverna atra (the Little Black, No. 10). The popular name has been conferred on this species because sometimes the front wings are entirely black; but these supposed varieties may possibly prove distinct species. The Caterpillars feed on Hawthorn berries, in October; those producing the black variety, however, according to Mr. Stainton, feed on the young shoots of Apple. The perfect insect appears in June and is very common.

The other ten species are—*Laverna propinquella; L. lacteella; L. Staintoni; L. Stephensi; L. Epilobiella; L. ochraceella; L. Phragmitella; L. decorella; L. subbistrigella; L. Rhamniella;* and *L. conturbatella.*

Among these, *Conturbatella* is remarkable for exhibiting very distinctly the generic character of the raised tufts of scales on the fore wings, which are bluish black, each having six tufts of raised scales and two conspicuous white spots. *Propinquella* has the head and thorax pure white; and *L. Stevensi*, the fore wings gray varied with tawny. This last species is extremely rare.

The genus *Chrysoclista*. The characters which distinguish the insects of this genus are nearly the same as those belonging to the last, with the exception that the raised tufts of scales are generally brightly metallic. There are four British species.

Chrysoclista Linneella (the Linnæan, No. 11). This species has three tufts of silvery black scales near the inner margin of the front wings. The Caterpillar feeds beneath the bark of the Lime and other trees in autumn and spring, there being two broods. The perfect insect appears in May and again in July. It is very common about the suburbs of London.

The other three species are the following. *C. bimaculella*, which resembles the preceding, but has the black border of the fore wings broader, except at the front, where the orange reaches to the edge. It is very rare. *C. Schrankella*, which has the front wings bright orange, black at the tips and bases, and some silvery lines. *C. flavicaput*, which may be at once known by the bright yellow head and face, from which it has derived its specific name.

The genus *Heliodines*. In this genus the perfect insects have the abdomen thicker and shorter than in the immediately preceding genera; and the wings have much less conspicuous tufts of scales. There is but one British species.

Heliodines Roesella (the Rœsellian, No. 12). This is a very rare species, not lately taken. The larva, which is pale green with a black head, feeds upon *Chenopodium* and other plants in June, the perfect insect appearing in July and August. It was formerly taken near London.

The genus *Anybia*. The insects assigned to this genus have the wings smooth, that is to say, entirely without the raised tufts of scales of the preceding genera. The palpi are recurved. There is but one British species.

Anybia langiella (No. 13). The Caterpillar of this species is green, the head being brown and the second segment black. It appears in July, and the perfect insect in August. It has been recently observed at Linton, at Exeter, and other places.

The genus *Asychna*. The fore wings are narrow, and of a metallic bronzy tone. The hind wings excessively slender. There are four British species.

Asychna terminella (the Dalean Asychna, No. 14). The six silvery spots on each of the fore wings of this pretty little insect make it somewhat conspicuous, though the dots in themselves are small. The Caterpillar is whitish with a brown head. It feeds on *Circæa Enetiana*, in September and October, and the perfect insect appears in the following June. It has lately been noticed at Scarborough in great abundance.

The other species, *A. modestella*, *A. fuscociliella*, and *A. æratella*, have the front wings nearly unicolorous, of bronzy green or brownish. *A. fuscociliella*, which is of a grayish bronze tone, is very rare.

The genus *Chrysocorys*. The insects assigned to this genus have the antennæ thick and short, the front wings narrow, and the front edge waved, getting convex near the tip. There is only one British species.

Chrysocorys festaliella (the Narrow-winged, No. 15). The Caterpillar of this species is pale green and slightly bristly, feeding on the underside of the leaves of the Rubus family in August. The perfect insect appears in June and July. It is common, and in many places very abundant.

The genus *Stephensia*. The insects assigned to this genus, which is newly added to the British list, have the palpi pointing downward and the fore wings narrow, with the front edge concave near the middle. There is only one British species.

Stephensia Brunnichella (the Brunnichean). I have not been able to procure a specimen of this new species to draw from, and must therefore be content with a description which Mr. Stainton gives, as follows. "The fore wings are dark golden brown, with a golden fascia close to the base; a slender bright golden fascia in the middle, a golden spot *perpendicularly* placed at the anal angle, and one beyond it on the costa, pointing

inwards." The Caterpillar is greenish white, with a black head. The perfect insect appears in May and again in July, and has been taken at Bristol in some plenty, and at a few other places sparingly.

The genus *Elachista.* The insects assigned to this genus have the palpi slender and recurved; the fore wings generally long and narrow, and the hind wings very narrow and pointed. These characters are, however, subject to considerable modification in the different species, which amount to forty-one in number.

Elachista Pfeifferella (the Four-spotted Gold, No. 16). The coppery golden tone of the ground colour of the fore wings of this pretty species cannot be imitated in a representation. Two of the bright gold spots are sometimes spread into one. This insect is taken in the Kentish woods about the end of May, but little is known of its habits, and it is very rare.

Elachista albinella (Albin's Elachista, No. 17). This species is taken in June in woody districts.

The other species of *Elachista* are :—*E. Treitschkiella; E. Gleichenella; E. Brunnichella; E. magnificella; E. apicipunctella; E. albifrontella; E. Holdenella; E. atricomella; E. luticomella; E. Kilmunella; E. alpinella; E. cinereopunctella; E. trapeziella; E. nigrella; E. subnigrella; E. occultella; E. consortella; E. pulchella; E. Bedellella; E. obscurella; E. zonariella; E. gangabella; E. obliquella; E. abruptella; E. Megerlella; E. adscitella; E. cerusella; E. Rhynchosporella; E. Elcochariella; E. biatomella; E. serricornis; E. triatomea; E. triseriatella; E. collitella; E. pollinariella; E. rufocinerea; E. ochrella;* and *E. cygnipennella.*

This genus has been remodelled by Mr. Stainton since the Museum arrangement which I am following was adopted, and some of the species have been otherwise located. Many of them are, however, retained, and among them the following, which illustrate three or four sections of this extensive genus. *E. magnificella* is one of the moderately large species. The fore wings are rich brown, with a pale gold band and gold spots. *E. triatomea* is of about the same size, and has the front wings white with three black dots. *E. cerusella* is one of the largest of the genus, the fore wings being white, with brown and black markings. *E. cygnipennella*, the "Swan Feather," is perhaps the largest of the genus, and is pure white without spot or mark. *E. Bedellella* is, on the other hand, one of the smallest species, and has the fore wings gray, with a white band and dots.

The genus *Tischeria.* In this genus the antennæ of the males are short, and furnished with long and slender hairs; the palpi are slender and drooping. The legs of the larvæ are imperfectly developed. They are leaf-miners. There are four British species.

Tischeria complanella (the Red Feather, No. 18). The Caterpillar feeds in Oak leaves in September and October, and the perfect insect appears in the following June. It is an abundant species almost everywhere.

The other three species are—*T. Dodonæa*, with the front wings bright straw-colour, clouded with gray; *T. marginea*, with the front wings clear pale yellow bordered with brownish; and *T. angusticollella*, with the front wings purplish brown, with a bronzy patch at the base.

The eleventh family of the sub-division *Tineina* is that of the *Lithocolletidæ.* The general characteristics of the insects located under the present family denomination are—head rough, labial palpi slender and drooping, fore wings of long proportion, and hind wings very narrow and pointed, with long fringes. The most distinctive mark is that appertaining to the larva stage, the Caterpillars having only fourteen legs. They are leaf-miners.

The forty-five species comprised in this compact family all belong to a single genus. But though they are sufficiently homogeneous in general character to exhibit good generic affinities, they are very various in their markings and aspects as regards colour and its distribution, and some of them are among the most brilliantly tinted and prettily marked in the whole range of British Micro-lepidoptera. Most of the species pass the winter in the chrysalis stage, and are double-brooded.

The genus *Lithocolletis*, as the only one of the family, necessarily presents the precise characteristics previously described in defining the distinctive features of the family. There are, as before stated, forty-five British species.

Lithocolletis corylifoliella (the Hazel Red, No. 19). The Caterpillar of this species feeds beneath the upper surface of the leaves of Hawthorn, in July and September. The perfect insect appears in May and August. It is a common species, often excessively abundant.

Lithocolletis trifasciella (the Tawny Treble-bar, No. 20). The Caterpillar of this prettily marked species feeds on the under side of the leaves of Honeysuckle, in April and September. The perfect insect appears in May and November. It is a common species, and is especially abundant in some parts of Devonshire.

The other species are—*L. Roboris ; L. hortella ; L. Amyotella ; L. Lantanella ; L. triguttella ; L. quinqueguttella ; L. nigrescentella ; L. irradiella ; L. lautella ; L. pomifoliella ; L. Coryli ; L. spinicolella ; L. Faginella; L. salicicolella ; L. viminetorum* ; *L. carpinicolella ; L. ulmifoliella ; L. Spinolella ; L. quercifoliella ; L. Messaniella ; L. Caledoniella ; L. viminiella ; L. Scopariella ; L. ulicicolella ; L. alnifoliella ; L. Heegeriella ; L. Cramerella ; L. tenella ; L. sylvella ; L. emberizæpennella* ; *L. Frölichiella ; L. Dunningiella : L. Nicellii ; L. Stettinensis ; L. Klemannella ; L. Schreberella ; L. tristrigella ; L. Scabiosella ;* and *L. comparella.* Among the following may be cited as examples of the varieties of marking exhibited by different species. *L. Roboris* has the fore wings white, with a delicate net-work of black lines at the apex. *A. lautella* has the front wings bright rich orange, with delicate silvery streaks. *L. ulmifoliella* has the front wings dark saffron, with white streaks and bands. *L. salicicolella* has the front wings of glossy but delicate saffron colour, slenderly streaked, and spotted with white. Only a few of the species are rare, and those not among the most beautiful.

The twelfth family of the sub-division *Tineina* is that of the *Lyonetidæ.* In this family the perfect insects have the antennæ furnished with a peculiar basal joint, which extends partially over the eyes ; the labial palpi are drooping, and sometimes only rudimental. The wings are narrow. The Caterpillars differ from those of the last family in having the full complement of sixteen legs. There are five genera in this family, comprising twenty-two species. Among these are some of the prettiest of our Micro-lepidoptera—many of those belonging to the genus *Cemiostoma* being literally resplendent in their raiment of purple and gold. Most of the species appear in May and June, but a few in the autumn. These latter hybernate and appear again in the spring.

The genus *Lyonetia.* The insects assigned to this genus have the antennæ long and slender, with a basal joint of the family character, but not so large as in other genera. There are two British species.

Lyonetia Clerckella (the Clerckian, No. 21). Sometimes the front wings of this species are so much suffused with the brown tinge as to obscure the markings. The Caterpillar feeds on the leaves of various fruit trees, making long serpentine mines beneath the upper surface. There are several broods in the year, the perfect Moth appearing in June, August, November, and March. It is a common and often abundant species.

The one other species, *L. padifoliella,* is much more rare. The ground-colour of the fore wings is purer white than in the preceding species, and there is a dark brown line along the front edge ; otherwise the two species resemble each other very closely. *Padifoliella* has been taken near Stony Stratford.

The genus *Phyllocnistis.* This genus is very closely allied to the last. The antennæ are however shorter, and the basal joint less conspicuous. The palpi are slender and drooping. There are two British species.

Phyllocnistis saligna (the Single Dot, No. 22). The Caterpillar feeds on the under side of Willow leaves in June and August. The perfect insect appears in July and September, and the hybernating individuals in April. It is not a common species, but in the neighbourhood of London it is perhaps more frequent than in other localities.

The other species, *P. suffusella,* closely resembles the preceding, but the brown blotch beyond the middle is not enclosed between two dark lines as in that species. This last species has been recently very abundant in the neighbourhood of Micklcham.

The genus *Cemiostoma.* The insects assigned to this genus have the head smooth ; the antennæ with moderately sized basal joints extending above the eyes ; and the palpi are absent or rudimental. There are five British species, all more or less remarkable for their beauty.

Cemiostoma Spartifoliella (the Gold Dot, No. 23). The Caterpillar of this species is slender, and of a pale green colour ; it burrows under the bark of the Broom in April and May. The perfect insect appears in May and June. The illustration can do no justice to the graceful markings of this elegant little Moth, on account of its diminutive scale. In the middle of the fore wings, in perfect specimens, are two pale yellow spots delicately edged with brown, and below is a black spot dotted in the centre with violet—even the fringes are minutely variegated with slender streaks.

The other species are *C. laburnella*, *C. Wailesella*, *C. scitella*, and *C. Lotella*. Among these *C. scitella* is the handsomest. The front wings are full deep gray, delicately streaked with white and brown, and ornamented with a rich coppery blotch, and a well-defined black dot, which has a central speck of glittering metallic violet.

The genus *Opostega*. The insects assigned to this genus have the head rough in front; the antennæ have the projecting basal joint or eye-cap very large; the fore wings are rather blunt at the apex. There are three British species.

Opostega auritella (the Eared, No. 24). Both the specific and popular names of this species have reference to the remarkable enlargement of the basal joint of the antennæ, the projections having somewhat the appearance of ears, though better described as eye-caps. The Caterpillar of this species is unknown. The perfect insect is taken in the Fens of Cambridgeshire in June, but it is rare.

The other species are *O. salaciella* and *O. crepusculella*. The first has the front wings white without spot or mark, but with a faint yellow tinge. The second is also white, but variegated with strongly angulated cross bars of brown.

The genus *Bucculatrix*. The insects assigned to this genus have the head tufted; the antennæ short, and rather robust, but with the basal joint less than in the preceding genus. The palpi are absent. This genus is the least attractive of the group. There are eleven British species.

Bucculatrix Ulmella (the Elm Bucculatrix, No. 25). The Caterpillar of this species is pale olive-gray, with a brown head. It feeds on the foliage of the Oak, in July and September. The perfect insect appears in May and August. It has been recently observed in some plenty at Bristol, Plymouth, and other places.

The other species are *B. aurimaculella*, *B. cidarella*, *B. Cratægi*, *B. Demargella*, *B. maritima*, *B. Boyerella*, *B. Frangulella*, *B. Hippocastanella* and *B. cristatella*. Among these, *B. aurimaculella*, with the front wings bronzy gray, with two yellow spots, and *B. cidarella*, with the front wings purplish brown, relieved with two white spots, are the only species at all remarkable. The colours of nearly all the others are dull and confused.

The thirteenth family of the sub-division *Tinæina* is that of *Neptieulidæ*. In this group the head is hairy, the antennæ short and thick, but with the basal joint as in the last family. The maxillary palpi are well developed, and folded. The fore wings are broad and short. The Caterpillars are nearly maggot-formed, the rudimental feet, however, exceeding in number those of the most highly developed Caterpillars, and consist of nine pairs. They are leaf-miners. This family comprises only three genera, but the first and typical genus, *Neptieula*, contains alone forty-two species; the other genus, *Trifurcula*, only four, and the last, *Bohemannia*, only one. Among these thirty-four species are to be found the smallest of known Moths, while some of the most minute of these, as if to make up for their microscopic size, are truly resplendent in rich colours, and brilliant metallic markings of gold, silver, and bronze.

The genus *Nepticula*. The characters detailed in defining the main features which distinguish the family, apply also to this genus, which is the typical one.

Nepticula floslactella (the Creamy Pigmy, No. 26). The Caterpillar of this minute species is of a pale yellow colour; it feeds on the leaves of the Nut and Hornbeam, in July and October; the Moth appearing in May and August. It is abundant almost everywhere.

The other species are :—*N. atrieapitella; N. rufieapitella; N. pygmæella; N. Pomella; N. Oxyaeanthella; N. viscerella; N. anomalella; N. cryptella; N. Cathartieella; N. Septembrella; N. intimella; N. Headleyella; N. Weaveri; N. subbimaculella; N. argyropeza; N. apieella; N. serieopeza; N. trimaculella; N. quinquella; N. Salicis; N. Myrtilella; N. luteella; N. ignobilella; N. areuata; N. angulifaseiella; N. atricollis; N. mierotheriella; N. Poterii; N. argentipedella; N. Aeetosa; N. betulicola; N. Plagieolella; N. Malella; N. Tityrella; N. Glutinosa; N. gratiosella; N. Pruetorum; N. Regiella; N. continuella; N. Alnetella; N. marginicolella*, and *N. aurella*.

Among these may be particularised for their rich colours and glittering metallic gloss, the following :—*N. ignobilella*, with the fore wings light golden brown, with a distinct shining band of delicate straw-colour, the

tips of the wings shining with a metallic purple gloss, and the head being of rich warm red; *N. argentipedella* with the front wings of a brilliant black flushed with a violet gloss, and a bright clear transverse band of white; *N. acctosæ*, with the front wings of a dusky but rich bronze, traversed by a band of dark violet, followed in the same transverse direction by a delicate streak of clear white; and, lastly, *N. Plagicolella*, one of the most minute of the genus, perhaps the smallest of known Moths. This species has the fore wings of a dusky metallic brown flushed with a violet tinge, and traversed by a glittering light band with a silvery gloss.

Forming a collection of the minute but brilliant little Moths of this class, appears at first somewhat hopeless, and, in fact, it does require a practised eye to perceive these minute specks of rich colour on the shady side of old half-rotten paling, or half concealed in some sheltering crevice of the bark of an old tree; but habit soon schools the eye to the search. While in the larva state they are very easily collected in some numbers, a single leaf of Hazel often containing, for instance, from thirty to forty young Caterpillars of *N. microtheriella*, all of which, by placing a net over the branch, may be easily secured, and when they have attained the chrysalis stage be removed. Many new species doubtless remain to be discovered, twelve having been added to the list since 1854.

The genus *Trifurcula.* The insects assigned to this genus only differ in generic character from those of the preceding, in the neurations or veins of the wings, which in this genus form a tridented fork, as the name implies. There are four British species.

Trifurcula immundella (No. 27). The Caterpillar of this species is unknown. The Moth appears in July and August. It is a common species, and has been recently noticed in great abundance in several localities.

The other species closely resemble the one figured. *T. atrifrontella* may, however, be distinguished at once by its black head, while *T. squamatella* has the head of a dull yellow colour; the head of *T. pulvcrosella* is of a dull red colour.

The genus *Bohemannia.* The insects assigned to this genus resemble the two preceding, but the perfect insects have the hind wings much broader, and the fringe narrower. There is only one British species.

Bohemannia quadrimaculella. This species, which is newly added to our native list, I have not seen. It is described as having the front wings of a metallic coppery tone, with a yellowish spot on the inner margin, and another on the front edge. The head is described as reddish. The specimen described was taken near Lyndhurst, in the New Forest district.

The sub-division *Pterophorina* is one of very marked character, the entire structure of the wings of the insects assigned to it being different to any yet described. Instead of being composed of a thin transparent web or skin strengthened by a branch-work of veins, or more properly neurations, the neurations in this group form the stem or mid-rib of a series of feathers. In the front wings these feathers are only divided for a small part of the distance from the apex of the wing, but in the hind wings nearly to the base; and from this peculiar formation arises their popular name, the "Plumes." The first genus at present included in this well-defined group has, however, no such division in either pair of wings. It would appear advisable, indeed, to separate the genus *Adactyla* from the group, making it the representative of a separate family—the link between the *Nepticulidæ* and the Plumes. At present, however, *Adactyla* is located with the *Pterophorinæ.* In some further remodelling of this group, *Adactyla* will, in all probability, be separated from it; and a section of the genus *Pterophorus*, with hardly any separation or slit in the fore wings, might make at least a distinct sub-genus; while *P. pentadactylus*, the Common Plume, which has the front as well as the hind wings distinctly feather-formed and split to the base, must necessarily form a separate genus. I am, however, following at present the method now adopted in the collection of the British Museum.

The genus *Adactyla.* The insects assigned to this genus are readily distinguished by their plumeless wings, which have no indication of the slightest division, even at the fringed edge.

Adactyla Bennctii (the Plumeless Plume, No. 28). The Caterpillar of this species feeds upon coast plants, such as *Statice Limonium*, &c., &c., in May, and the Moth appears in July. It has been recently taken in the Isle of Sheppey, and on the Essex coast.

The genus *Pterophorus.* The insects assigned to this genus, as it is at present constituted, have in some

species the front wings almost without the indication of a division, or slit, at the fringed edge ; but the hinder pair are invariably divided nearly to the base in three distinct segments, or feathers. There are twenty-eight British species.

Pterophorus Rhododactylus (the Rose Plume, No. 29). This is the most prettily marked and richly coloured of the Plumes. The Caterpillar (No. 30) feeds in the flowers of Roses in June, and forms a compact cocoon (No. 31). The Moth appears in July and August. It has been recently taken at Kingsbury, Lewisham, and other places.

The other species are :—*P. ochrodactylus ; P. isodactylus ; P. trigonodactylus ; P. Zetterstedtii ; P. Acanthodactylus ; P. punctidactylus ; P. parvidactylus ; P. Hieracii ; P. Pillosellæ ; P. Phæodactylus ; P. bipunctidactylus ; P. Loewii ; P. plagiodactylus ; P. fuscus ; P. lithodactylus ; P. pterodactylus ; P. Licnigianus ; P. tephradactylus ; P. osteodactylus ; P. microdactylus ; P. brachydactylus ; P. galactodactylus ; P. spilodactylus ; P. Baliodactylus ; P. tetradactylus*, and *P. paludum*. Most of them have the wings more or less suffused with tones of brown or pinkish. *P. Pterodactylus* (the Common Plume) is darker than most other species, especially the feathery hind wings, which are deep brown. *Galodactylus* is nearly white, and *pentadactylus* (the Large White Plume, No. 32), sometimes popularly called the "Phantom," or the "Skeleton Moth," is snowy-white, though sometimes the front wings are delicately powdered with gray. The Caterpillars and Chrysalides of some of the above-named species are figured at Nos. 34, 35, 36, 37, 38, 39.

The sub-division *Alucitina* forms the last group of lepidopterous insects, as at present classified. It is at once distinguished by the structure of both pairs of wings, each being formed of six distinct feathers or plumes, united at the base. Several species exhibiting this peculiar structure are known on the Continent, but we have only one British species.

The genus *Alucita*. The characteristics of this, the only British genus belonging to the group, have been sufficiently detailed in the definition of the sub-division.

Alucita polydactyla (the Many-cleft Plume, No. 33). This interesting and singular species is also popularly known as the "Thousand Plume" in some districts. The Caterpillar of this species is distinguished from those of the *Pterophori* by its smoothness, and by its habit of forming a cocoon, in which it changes to the Chrysalis state. This species is very common. The Caterpillars feed in the buds of Honeysuckle, in June and July, and the Moths appear in September and October, after which they hybernate in out-houses or dwelling-houses, and are on flight again in April or May.


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PLATE LXII.

(SUPPLEMENTAL.)

No. 1.—The Reed Leopard (*Phragmatœcia Arundinis*).

No. 2.—The Plumed Prominent (*Ptilophora plumigera*).

No. 3.—The Caterpillar of the Plumed Prominent.

No. 4.—The Dusky Marbled Brown (*Gluphisia crenata*).

No. 5.—The Figure-of-Eight Moth (*Diloba cœruleocephala*).

No. 6.—The Long-horned (*Phibalocera Quercana*).

No. 7.—The Orange V-Moth (*Spatalia bicolora*).

No. 8.—The Caterpillar of the Orange V-Moth.

No. 9.—The New Scarlet Tiger Moth (*Hypercompa Hera*).

No. 1. *Phragmatœcia arundinis* (the Reed Leopard). This species, described at page 15, has been popularly named the Reed Leopard, in consequence of its general affinities with the Wood Leopard, the white wings of which are beautifully spotted with black, while its own wings are almost entirely without mark. The Caterpillar, according to Ochsenheimer, is yellowish, with the head and second segment brown. It feeds within the stems of the Common Reed in April, and the Moth appears in June. The antennæ of the male are strongly bipectinated, as shown in the illustration, but those of the female are longer and only ciliated. The body of the female is of extraordinary length, greater perhaps in its relative proportion to the rest of the structure than in any other moth, native or exotic. The body of the male, as represented in our plate, is perhaps rather too long for the male, but not sufficiently so to represent that of the female. When my first drawing of this species was made, in 1845, from a fragment of a specimen found by Mr. H. Doubleday floating on a pond in Epping Forest, there was not a single specimen in the collection in the British Museum, and many thought there was not sufficient authority for considering the species to be British. But there are now nearly a score of fine specimens in the national collection, the capture of which has been well authenticated. It is in fact not of extreme rarity in some seasons in marshy districts, and was once abundant at Whittlesea Mere, Lincoln.

No. 2. *Ptilophora plumigera* (the Plumed Prominent). This singular species, so remarkable on account of the singular antennæ of the male, from which it takes both its popular and scientific name, was not illustrated with a figure, for want of a good specimen, when the description at page 19 was published. The present figure (No. 2) has been prepared to supply that omission, as also No. 3, the Caterpillar.

No. 4. *Gluphisia crenata* (the Dusky Marbled Brown). This illustration has also been introduced here to supply the omission in Plate V. In the description of this Moth at page 19, the rarity of this species is not alluded to. It is, however, very scarce, and has only been taken at Epping, and at Halton in Buckinghamshire.

No. 5. *Diloba cœruleocephala* (the Figure-of-Eight Moth). The description of this Moth at page 19 is unaccompanied by a figure, which the present illustration will supply. It is a common species, and very generally distributed.

No. 6. *Phibalocera Quercana* (the Long-horned). This figure is intended to illustrate the description of the genus *Phibalocera* at page 173.

No. 7. *Spatalia bicolora* (the Orange V-Moth). I have called this handsome new species "the Orange V-Moth'

in allusion to the strong and angular black mark in the centre of the fore wings, which somewhat resembles a very widely opened letter V, while the deep rich orange within it gives it the appearance of being illuminated with orange, and so becoming an "orange V." This somewhat too fanciful designation may serve as the English name of this handsome acquisition to our list of native Moths, till a better is coined for it. As I stated at page 18, this fine insect was first discovered by the enterprising collector Mr. Bouchard,* in the autumn of 1858. He discovered it in the west of Ireland, where he has this year (1859) taken another perfect specimen, which is now in the British Museum, and from which the present illustration was drawn. The Caterpillar (No. 8) is drawn from the description of Gœdart. This insect is tolerably abundant in some parts of the Continent, especially in the neighbourhood of Valenciennes, but it is very local.

No. 9. *Hypercompa Hera* (the New Scarlet Tiger Moth). This is another splendid novelty recently added to our list of native Lepidoptera. The first well-authenticated capture of this beautiful species occurred in 1855. Mr. Reeve, of Newhaven, Sussex, made the following statement in the "Zoologist" on the occasion :— "Capture of *Callimorpha Hera*† on the coast of Sussex. I beg to record in the pages of the "Zoologist," the capture of a single specimen of *C. Hera* on the wing in this town, on the 5th of September, 1855." This appeared in the fourteenth volume of the "Zoologist," in 1856. No other specimen was heard of till the present season (1859), when I received a letter dated August 15th, from Mr. Russell of Monk's Eleigh, Bilderstone, Suffolk, in which he says, "While on a visit the week before last at Wrexham, North Wales, I took five specimens of a Moth unknown to me." A specimen was afterwards forwarded to me at my request, which proved to be *Callimorpha Hera;* and which, at the request of Mr. Russell, I presented in his name to the British Museum, to be placed in the fine national collection of British Lepidoptera of that establishment. I have since heard of another specimen being taken this season on the coast of Devonshire, and there are reports of some other captures, so that this handsome insect may now be considered as fairly on the list of our native *Arctiidæ*.

* Misprinted *Bouchone* at p. 15.

† Mr. H. Doubleday's name of the genus.

THE BEST METHODS OF PRESERVING BUTTERFLIES AND MOTHS;

AND OF

REARING THEM FROM THE CATERPILLAR OR THE EGG.

To capture Butterflies and Moths in their perfect or winged state, it is necessary that the collector be provided with a small gauze net, attached to a hoop of strong iron wire at the end of a light cane handle about three feet long. Nets of this kind are sold at Messrs. Gardner's, in Holborn, and Messrs. Shepherd's, in the Strand; who manufacture articles of this kind of better quality than can possibly be the result of home fabrication. Boxes lined with cork for securing the insects when taken, as well as many other entomological conveniences, are to be purchased at those establishments, and also at many others of the same kind.

The collector will soon find out the hour of the day at which the insects he is seeking generally appear on the wing; and it is almost useless to seek them at any other. It is also in vain to attempt collecting insects on the wing in a cold easterly wind, especially such as fly early in the morning, or towards the hours of evening. Butterflies, with very few exceptions, will be found more plentiful in the sunny hours preceding, and those immediately following the heat of the day; while for a short period, during the sun's greatest heat, they disappear for a short time. Some fly principally in half shade of woods and deep lanes, while others seek in preference the bright open sunlight. Others take their flight high above the tops of the loftiest Oaks, as the Purple Emperor, and these must either be secured by means of a small light net at the end of a very long rod, or, some little stratagem must be had recourse to in order to effect a capture. I recollect an experienced Lepidopterist telling me that he took his two finest specimens of the Purple Emperor in an Oak wood, rather late in the day, after a morning of fruitless attempts, by watching the trunks of the trees as a storm was coming on. He had heard that these insects, on the approach of a storm, descended from the region of their lofty flight to seek shelter on the trunks and beneath the lower branches of large trees; and as the sky darkened, and the thunder began to rumble in the distance, he found that his information had been correct, for he perceived two magnificent specimens descend with a swoop, and settle upon an old gray trunk close to him, where he was so fortunate as to capture both.

As an example of what an earnest collector may expect in an excursion of a few days, even without much experience, I append a letter received this season from a young collector, in which it will be seen that, as far as Purple Emperors are concerned (from knowing a good locality to go to), he was by far more successful than my friend of the thunder-storm; and his other captures form a very tempting list.

"I captured on Friday last, in St. Osyth Woods, Essex, a very fine specimen of *Vanessa Antiopa*; the borders of the wings are a rich cream-colour, the points of the upper wings are slightly marked with blue. I took it off a bramble. I also took at the same place a female specimen of the Large Copper (*Chrysophanus Dispar*). In the neighbourhood of this place (Monk's Eleigh) and Savenham, I have found this summer a greater number of varieties than usual; amongst others, *Chrysophanus Phlæas* (female); *C. Virgaureæ; Thecla W-album; Melitæa Cinxia; Argynnys Adippe; A. Lathonia; A. Paphia; Grapta C-album; Vanessa Urticæ; Cynthia Cardui; Apatura Iris* (of which I also took thirty at St. Osyth); *Limenitis Sibilla; Arge Galathea; Leucophasia Sinapis: Papilio Machaon; Colias Hyale* (two taken this morning); and *Aporia Crataegi.* The *Vanessa Io* is extraordinarily numerous this year, as much so as *Picris Brassicæ.*"

To take *Moths* on the wing, other deviees must be had reeourse to ; a few, it is true, fly by day in the bright sunshine like Butterflies, but by far the greater number take their flight at early dawn, in the dusk of the evening, or during the successive hours of the night, eaeh speeies having a speeial period of aetivity, from whieh it does not depart.

The following are a few of the speeies whieh may be attraeted, in suecession, by a lighted candle. *Pheosia Dictœa*, popularly ealled the Swallow Prominent, may be easily distinguished ; in its fitful flight, when agitated by the eandle, this inseet continually darts towards the ground, and is lost in the darkness, soon again to appear glaneing swiftly past the light, and then downward into the shade, as before. *Agrotis corticea*, the Heart and Club Moth, is less fleet on the wing than the preeeding, and instead of flying downwards towards the floor, invariably rises towards the eeiling, attracted apparently by the mild white light by whieh it is pervaded. *Cosmia Pyralina* (the Lunar-spotted Pinion Moth), if it enter a room attraeted by the light, is very wild and irregular in its flight, dashing from the eandle to the eeiling, and from the eeiling to the floor. Though this inseet is by no means eommon, I have taken it more than once in a lighted room, always, I believe, on a rainy evening, and towards the end of July. *Clisiocampa Neustria*, the Laekey Moth, is as abundant as the last deseribed species is rare, and yet it is seldom seen in the perfeet form, as it is a swift night-flyer. This moth, on entering a room, attraeted by a light, has the same wild flight as the speeies last described, and is rather diffieult to eapture, even with the aid of a proper net. Later in the season may be taken *Pctasia cassinea*, popularly known as the Sprawler, whieh, like the last, is mueh more rare in the winged state than in the Caterpillar stage of its existence. It is however often attraeted by a light, when its flight becomes random, dashing heedlessly on all sides through the flame of the candle up to the eeiling, or down to the floor. This speeies seldom appears before November, and is often found as late as Deeember. It is late in the hour of its flight, as well as in the season of its appearance, often retarding its visit to the expeetant eandle till one or two in the morning. Still later in the year appears the remarkably elegant Deeember Moth, *Pœcilocampa Populi*, whieh is easily attraeted by light, and, if any be in the neighbourhood, they will make their appearanee between the hours of seven and ten on favourable evenings.

Sitting in a well-lighted room, with the window open to the dark garden, a wateher, aetive with the net, may eapture in suceession many species in a single night. But before the shades of evening have sunk into darkness, the eollector should have perambulated, net in hand, the most shady walks of his garden, beating the shrubs with a stiek held in the left hand ; when he is sure, at the right season, to meet with the male Ghost Moth, flitting white and bright before him, and then vanishing as suddenly, as the dark under side of the wings meet the eye instead of the snow-white upper surfaee. Then there will be the Phantom Moth, like the miniature skeleton of some delieate inseet, haunting the spot where it had onee flitted in more substantial shape. This is the "White Plume," sometimes ealled the Skeleton Moth. These and many more rare and handsomer speeies will reward persevering pursuit on a favourable evening.

A very sueeessful method of eapturing night-flying Moths, is that of tempting them to settle in a certain spot by a bait of sugar. The sugar is reduced to a thiek solution by the addition of water, and then brushed upon the trunks of trees, old palings, &e., in favourable situations. The baited spot must be visited onee an hour or so, or the insect may have paid the visit, and again taken to flight. Some eollectors plaee a light near the sugared trees as an additional attraetion, and some add a large white sheet behind the sugared trees, upon whieh the light should be made to fall as brightly as possible.

At dawn of day, on a fine mild summer morning, some of the rarer *Sphingidæ* may be taken fluttering over their favourite flowers. I took a magnifieent speeimen of *Sphinx Convolvuli* hovering above a bed of Petunias, this season.

The preservation of inseets thus taken is very simple, and the best methods are perfeetly known to all experieneed entomologists. But I am writing for those who are at present without sueh experienee. The Butterfly or Moth, while still in the net (which should be allowed to lie elose together, so as to prevent as much as possible the movement of the inseet), should be taken hold of by the thumb and finger underneath the ehest, and suddenly pinehed with some little foree, whieh immediately destroys all sensation. It may then be dropped lightly from the net, so as not to injure the delieate seales of the wings. An entomologieal pin * must then be

* Pins that do not corrode, and which are sold by all vendors of collecting apparatus.

passed through the thorax from the upper side, between the wings, in a perfectly upright position, passing through to a sufficient extent to allow of the insect being firmly pinned to the bottom of the cork-lined box. The same process will be followed in all subsequent captures, taking care not to place the specimens too close together in the box.

Some collectors put each insect, if a particularly fine specimen, or very rare species, into a separate box, touching the bottom of it with a single drop of chloroform, which has been found to prevent any return of sensation, or any fluttering of the wings by which their beauty might be seriously injured.

On arriving at home, the insects should be carefully set out in the form they are intended to retain permanently, and this should necessarily be done before the insects finally stiffen, or it becomes difficult to manage them so well, though an exposure to the steam arising from a cup of hot water will generally restore a temporary limpness. The process of "setting out" must, of course, be done with neatness and care, so as not to injure the wings, or break the antennæ. A board covered with a coating of cork must be provided, in which there are grooves running across of greater or lesser depth. The insect may then be fixed by the pin into the groove according to the thickness of the body. The body of a Butterfly being generally small, the groove need not be deep. The wings are then to be spread out on the board on either side, level with the body and fully expanded. They are to be fixed in that position by means of strips of thin and very smooth cardboard, pinned down over them sufficiently close to hold them in the position required, but not so close as to injure the delicate scales of the wings. In a few days the insect will have stiffened in the position in which it has been fixed as described, and which it will permanently retain. It should then be removed to the cabinet in which it is to be preserved. In order to preserve the specimens in a cabinet from the attacks of minute parasitic insects, a small piece of camphor is generally fixed in the corner of each drawer. If what is called the grease should attack the insects in a cabinet, the best mode of restoring the insects attacked to their original condition is the following. The grease generally appears in large-bodied Moths or Butterflies, giving the bodies the appearance of having been soaked in oil; and this appearance soon spreads to the wings, utterly destroying the beauty of the specimens. To restore an insect thus attacked, fix it on a piece of cork weighted with lead, or something heavy, and place it at the bottom of a saucer or any similar vessel. Then fill the saucer with benzone,* entirely covering the insect, which will not be injured by the wetting. After five minutes it may be taken out, and the benzone, being an absorber of grease, will carry off the oily matter in the course of its own evaporation, which is very rapid. The insect will then become as beautiful as when first "set out," and may be replaced in the cabinet.

The collection of Caterpillars may be commenced as soon as the leaves begin to appear, and may be continued till the end of September or October, as there are many double-brooded species, the second hatch of Caterpillars of which appears about the time last named, Chrysalides of which remain dormant through the winter. Detached trees may be well shaken after a white table-cloth has been spread beneath, and a number of Caterpillars, difficult to discover in any other way, may be thus secured. Hedgerows may be beaten over an inverted umbrella for the same purpose. A careful search among low-growing plants will, however, be necessary to secure other species, and a plant that exhibits symptoms of having been eaten by Caterpillars should sometimes be pulled up by the roots, and the root well examined, as the night-feeding Caterpillars often take shelter beneath the surface of the soil during the day, and conceal themselves among the loose roots; or they may sometimes be found hidden among the decayed leaves about the base of the main stalk of the plant. The Caterpillars of most of the Meadow brown Butterflies and many Moths, are grass-feeders, and yet meadow after meadow might be looked over in vain for a single larva, as in almost all cases they belong to the night-feeding class just alluded to. The truly magnificent Caterpillar of the Sword-grass Moth is, doubtless, a night-feeder, which accounts for its seeming rarity, few specimens having been seen by Entomologists. The Caterpillars that feed within the stems of plants, all belonging to the Moth family, are still more difficult to find, but their internal ravages may generally be traced by the paler or yellower green of the branch or stem, the sap of which is being consumed by an intruder; and on opening the branch he will be discovered at work; but it is better to leave him till his full growth is attained, marking the stem in some way so as to recognise it easily. The Leaf-rollers, Leaf-miners, and Bark and

* This remedy was first mentioned in a very charming little periodical, entitled "Recreative Science," which is always full of useful information.

Lichen-feeders, and those that feed in *cases*—concealed like those of the Caddis-worm in particles of decayed wood or dead leaves, will have to be looked for very carefully. When a Caterpillar or a brood of a gregarious kind has been discovered, it is better to leave them on the branch or plant of their own selection—covering it securely with a piece of gauze—than to attempt their removal. But if at a distance from home this would be impracticable, and in that case a "rearing cage" or box must be prepared. This is easily managed. A strong box, about two feet long by one broad, should be sunk to about half its depth in the ground in some sheltered part of a garden; the lid is to be of wire-tissue such as meat-safes are made of, and above it is to be a sloping board or roof to shoot off the rain. The box is to be about half-filled with broken bits of tile and garden mould, partially covered over with moss. The food for each kind of Caterpillar placed in the box should, in order to keep it fresh, be placed in a glass phial of water in the box; and in addition to this precaution the food should be changed every day. If, however, the food be changed every day, the bottles of water may be dispensed with in most cases, though they are always of advantage. In a box of this kind, so placed, the Caterpillars have the advantage both of open air and shelter; and they either burrow in the ground at the bottom to undergo their change, or suspend themselves to some branch which should be fixed for that purpose; or they attach themselves to the sides of the box. Care must be taken to watch the box carefully at the time when Moths or Butterflies are expected to emerge from their chrysalides, as they would otherwise, when prepared to take flight, beat themselves against the wire lid and injure their wings. I have described boxes of this kind at much greater length in the "Butterfly Vivarium." *

The eggs of Butterflies and Moths may also be placed in this rearing cage, where they will hatch themselves at the proper season, and if the proper food be provided for the young brood of minute Caterpillars, they will thrive well. The eggs of Moths and Butterflies may be found by watching the under side of leaves, &c.; when a mass of small and nearly spherical objects, somewhat less than a pin's head, are observed attached together on a leaf, placed in straight or diagonal rows with geometrical regularity, it may in most cases be taken for granted that they are the eggs in question. They are sometimes found in rings, encircling branches of shrubs, like double or treble rows of beads. But the collector will soon have an eye to perceive and recognise his game under very varied aspects and circumstances. Besides this mode of collecting the eggs, there is another. Almost every female Moth or Butterfly that is captured, will deposit its eggs before dying; indeed, it appears almost impossible to extinguish life in the female insect till this main object of its existence—the deposition of its eggs—has been effected. Rare and beautiful Caterpillars may often be raised in numbers from the eggs of a captured Moth, which it is difficult to procure in any other way, their natural haunts and habits being unknown.

The great advantage of rearing Moths and hatching Caterpillars in this way is—first, that the specimens of the winged insect are necessarily much more perfect than those captured during their flight; secondly, that the Caterpillars of some kinds of Moths are very common, while the Moth itself is rarely seen, and can only be procured by rearing it from the larva; thirdly, that some larvæ may be obtained in this way from the egg which are, as stated above, seldom otherwise seen.

I succeeded in procuring some magnificent specimens of the Death's-head Moth from the Caterpillar in a rearing cage of this kind. But an amateur Entomologist writes me that for that species his own method, as follows, is better:—"Last year I took three Caterpillars of the Death's-head Hawk Moth; one I kept in dry earth, one in a box buried in the garden, and one in a box in my study, which I regularly watered twice a week: the last succeeded admirably, it emerged in March; the two others appeared in the beginning of May, and were almost worthless." The eggs and chrysalides of many fine Continental species not found in England, may be procured at Mr. Gardner's, No. 52, High Holborn—such as the Great Emperor Moth, the handsome Butterfly *Papilio Podalirius*, and others. I have found great amusement and interest in rearing some of the finer Continental Lepidoptera in this manner, and then letting them fly in my garden, where they have sported for several days, and then disappeared; for it does not seem possible to naturalise any new species in this way. Confined to a greenhouse they might, however, exist through several generations, forming a great additional ornament, and giving quite a new source of interest to an ordinary Conservatory. H. N. H.

* Now published by Mr. Bohn, York Street, Covent Garden.

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Omitted at page 38, after *Cerapteryx graminis*. "The genus *Charæas*. The insects assigned to this genus have the antennæ pectinated in the males and simple in the females. The palpi are short. There is a tuft at the extremity of the abdomen in the males. The Caterpillars are root-feeders. There are three British species, *C. cespitis*, *C. lutulenta* and *C. Æthiops*. *C. Æthiops* (plate 14, No. 10), the species selected for the illustration of the genus, is very rare. Mr. Stephens knew but one specimen.

For Brephos *read* Brephas, p. 76.

For Scoliopteryx *read* Scoleopteryx, p. 61—62.

For Solenebia *read* Solenobia, p. 165.

For Spilonta *read* Spilonota, p. 140.

For Spylosoma *read* Spilosoma, p. 32.

For Cartesian *read* Curtesian, p. 169.

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